m/045/022

MagCorp (Knolls Facility) Bond Calculation

January 22, 2001 (11:54am)

Table of Contents

MagCorp (Knolls Facility) Reclamation Bonding Requirements

SUMMARY:

It has been determined by the State Office Minerals Staff that it is necessary for a bond to be placed by MagCorp. This bond is to insure reclamation of disturbed areas within their Right of Way for a Magnesium processing facility at Knolls Utah. ***Stipulation 17 states. "Prior to abandonment of the grant, the holder shall contact the Authorized Officer to arrange a joint inspection of the grant area. The inspection will be held to agree on an acceptable abandonment and rehabilitation plan. The Authorized Officer must approve the plan in writing prior to the holder commencing any abandonment and rehabilitation activities."*** The reclamation requirements are that ditches will be backfilled, baffle walls will be pushed into adjacent borrows and dikes are reclaimed by flattening them out and contouring. A cost estimate for reclamation has been performed by the Minerals Staff and resulted in the following.

INTRODUCTION:

The MagCorp (Knolls Facility) operation is located in the western portion of Tooele County, Utah, approximately 30 miles east of the community of Wendover Utah. This area is extremely flat with a nominal elevation of 4,212 feet above sea level. The production of Magnesium Chloride brines are derived from the solar evaporation. The operation consists of four basic steps:

1. Brine collection
2. Concentration of brine through evaporation
3. Precipitation of sodium and potassium
4. Concentration of the Mag Chloride brine.

In order to perform theses basic steps MagCorp collects mineral laden brines through a collection system. Please see Appendix 17 for photographs of the operation. The collection system consists of approximately 6 miles of a main collection ditch and approximately 11.7 miles of a collection ditch interior to Pond 0. The P1 pump station can pull brines either from the main collection ditch (6 miles) or from the main collection ditch and the interior Pond 0 (11.7 miles) ditch via a gate system at Pond 0. The brines are pumped through the P1 pump station which delivers about 50,000 gallons per minute. The brine from this pump can be diverted through a system of gates to either Pond 0 or Pond 1. Once in Pond 1, the brine is sent through a transfer ditch of about 3 miles which then flow into the P2 feed ditch. Once the brine reaches the P2 feed ditch they can be pumped from the P2 pump into the P7 ditch. The P7 ditch diverts the brine into Pond 7A. From Pond 7A the brine can be diverted into Pond 5 or Pond 7B. If the brine is diverted into Pond 5, they can be moved back into Pond 7B. From Pond 7B the brine is diverted to Pond's 7C and 7D. In Pond 7D the brine is essentially magnesium chloride brine. The brine can then be pumped from the 7D pump into one of two finished brine storage ponds. These ponds have pumps to move brines from one pond to another pond and to a sump. Once the brine is in the sump they are then sent to the Rowley facility via a pipe line for further processing.

The reclamation of the Knolls facility consists of the following:

1. Ditches and berms from ditches.
2. Exterior Dikes of the pond structures
3. Interior Dikes of the pond structures (including finish brine storage ponds)
4. Reclamation and removal of facilities

5. Reclamation of roads
6. Reestablishment of survey monuments

DITCH RECLAMATION

The ditches will be required to be filled in. This will alleviate any physical safety hazards for the public due to the berms and ground water remaining in the ditch. This will help to return the area back to a flat vista.

Ditch(es) Earthwork: Main Collection Ditch, Pond1 Bypass Ditch and P2 Feed Ditch.

The total length of ditches and baffles were approximated from the map at Appendix 1. The resulting lengths are as listed in Table 1.

TABLE 1.

Total Length of Ditches (feet)	
Facility Type	
Pond 1 Bypass Ditch	18,480*
Main Intake Ditch	31,000
No 2 Pump Feed Ditch	12,000
Pond 1 - Pond 2 and Pond 0 - Pond 2	1,500
Grand Total	62,980

*1990 Annual report states the ditch was dug 3.5 miles long. 3.5 miles * 5280 feet per mile = 18,480 feet.

The volume of the main collection ditch and P2 Feed Ditch was estimated by using the Dames & Moore "New Solar Pond Facilities located on West Desert for AMAX Magnesium, Inc., dated December 8, 1986" (Appendix 2). The volume of the material was taken and divided by the length of the ditch. In the case of the Main Intake ditch the estimated quantity of 550,000 yd^3 was divided by the length of 7.12 miles to determine the average cross sectional area. This was done because the ditch lengths were changed from the design in the Dames & Moore report versus the "As built" configuration.

$$\mathbf{A = (V*27)/L}$$

A = Area of the Ditch (ft^2)
V = Volume of the Ditch (sq feet) * 27 ft^2 per yd^3
L = Length of Ditch (miles) * 5280 feet per mile

A = Area of the Main Intake Ditch
V = 550,000 yd^3 (Appendix 2)
L = 7.12 Miles (Appendix 2)

A = (550,000 yd^3 *** 27** ft^3 per yd^3) / **7.12** miles *** 5280** feet per mile

Area of the Main Intake Ditch is = 395 ft^2

No 2 Pump Feed Ditch
A = Area of the Main Intake Ditch
V = 38,000 yd^3 (Appendix 2)
L = 1.53 Miles (Appendix 2)

A = (38,000 yd^3 *** 27** ft^3 per yd^3) / **1.55** miles *** 5280** feet per mile

Area of the Main Intake Ditch is = 125 ft^2 (see Table 5 for the 40,000 yds cast up material)

The Pond 1 Bypass ditch was taken from the 1990 Annual Report of Mining Operations for Knolls Solar Ponds (See Appendix 2)
The Pond 2 - Pond 0 was estimated

1. Main Collection ditch = 395 sq. ft.
2. No. 2 Pump Feed ditch = 125 sq. ft. ditch only (38,000 yd^3)
3. Pond 1 Bypass ditch = 240 sq. ft.
4. Pond 2 - Pond 0 By ditch = 150sq. ft. (Estimate)

Once this calculation is carried out, the resulting figure is the cubic feet of material that must be relocated. This figure was then converted into cubic yards using the following equation:

$$ft^3/27 = yd^3$$

where:
yd^3 = Cubic Yards of material
ft^3 = Cubic feet of material
The cubic yardage of material to be moved is summarized in Table 2.

The length of each ditch was then multiplied by their average cross sectional area to determine the volume.

TABLE 2.

Cubic Yards of material to be removed for Ditches (yd^3)			
Facility Type	Area (ft^2)	Length (ft)	$(yd)^3$
Main Collection*	395	31,400	459,370
No 2 Pump Feed Ditch	125	12,000	55,556
Pond 1 Bypass ditch**	240	18,480	164,267
Pond 1 - Pond 2 and Pond 0 - Pond 2	150	1,500	8,333
Grand Total Numbers may not add because of rounding		63,380	687,526

* Back Calculated from the Dames & Moore report on the New Solar Pond Facilities, 1986
** MagCorp 1990 Annual Report to the Division of Oil Gas and Mining
Pond 1 ditch wad not figured here but was figured in the with the dike calculations

Ditch Reclamation Plan:

A detailed equipment survey was not conducted on filling the ditches. In lieu of this approach BLM relied on the Preliminary Cost Estimate West Desert Solar Ponds for AMAX Magnesium, Inc., Appendix C construction cost estimate. This is found in the Dames & Moore Geotechnical and Construction Cost Studies for the New Solar Pond Facilities located on the West Desert for AMAX Magnesium, Inc. dated 1986, which the pertinent portions can be viewed in Appendix 2 of this document. All of the excavator or track hoe work was costed at $1.50 per yard except for the P1 ditch which was costed at $2.25 per yard. The P1 ditch had to have the material double handled and this is the reason why the cost was escalated. In the other ditches the material did not have to be double handled with two excavators.

The reclamation work on the P1 ditch will have to be handled by a large excavator due to the fact that the material cannot be doubled handled to fill the ditch back to its original level. The actual excavator that was used was a CAT 245 hoe. This machine will be able to accomplish the work in an efficient manner. The boom on the excavator will have to be approximately 50 feet long. It would be best if the ditches were pumped down and both sides were filled at the same time. This would require two excavators to work at the same time.

The costs were estimated using the $1.50 as a base cost for the excavator work. From the $1.50 per yard the costs will be adjusted for construction labor. This was an increase of 34% from 1986 to present.

The costs were reduced by a factor of 30% because this estimates the best cycle time of CAT 325B and CAT 330B which are similar to a CAT 245. The hoes can operate at an average of 12-13 seconds at the best cycle time versus 18-19 seconds on average cycle time. (See Appendix 3, Cost Reduction). This would be approximately a 30% increase in productivity. BLM applied a 10% contingency for items missed in the cost estimate based on the Means Estimating Guide. If BLM were to contract this out it would require an 18% administrative charge to be withheld. The following shows a breakdown of all the costs.

Description of Costs:

The following is a summary of all the costs included in the bond calculation:

Operating Costs

The base cost of $1.50 per yd^3 is taken from the preliminary cost estimate from the preliminary design of the facility (Appendix C, Preliminary Cost Estimate, West Desert Solar Ponds, Dames & Moore New Solar Pond Facilities for AMAX Magnesium, Inc., Dec. 8, 1986.). The reference page of cost data can be viewed in Appendix 2. It is understood that this cost includes overhead and profit.

Cost Reduction

The cost reduction of 30% was derived from page 5-146 of the Caterpillar Performance Book. It was based on the fact that to place the material back into the ditch would be easier than excavating the material. The 30% was based on the fact that under average operating conditions the cycle time would be 23 seconds and under easy conditions the cycle time would be 16 seconds. This can be viewed in Appendix 3.

Cost Index

Western Mine Engineering, Mining Cost Service page CL-2 shows a cost index of Construction Labor at 12.48 in 1986 and in March 1999 the index was 16.77. This equates to 34% increase in Construction Labor. Equipment and Machinery increased by 37% over the same period of time. The

reference page of cost data can be viewed in Appendix 4.

Contingencies

Means Facilities Construction cost Data recommends a 10% increase to the total cost for the contingencies. The reference page of cost data can be viewed in Appendix 5.

Administrative Costs

The Washington Office guidance is to apply 18% overhead on all reimbursable (5XXX) projects. For the reference pages see Appendix 6.

TABLE 3.

Summary of Costs for Reclamation of Ditches			
Type	**Cost** Cumulative ($/yd)	Yds	Total Cost
Operating	$1.50	687,526	$1,031,289
Reduced Costs for ease of job (-30%)	$1.05	687,526	$721,902
Cost Index from 1986 to 1999 Construction Labor Costs (34%)	$1.41	687,526	$967,349
Subtotal Direct costs			**$967,349**
Contingency (10%)	$1.55	687,526	$1,064,084
Subtotal (all costs)			**$1,064,084**
Administrative (18%)	$1.83	687,526	$1,255,619
Total Cost ($2000) Numbers may not add because of rounding			**$1,255,619**

Numbers are assumed to have overhead and profit included

EXTERIOR DIKES:

The BLM has chosen as a minium to grade all exterior dikes to a maximum of a 4 to 1 slope from the level of the existing pond out. This will get rid of physical hazards of steep slopes and areas where deep ponds would be and help return the area back to a more natural looking area.

Exterior Dike Earthwork:

The total length of ditches and baffles were approximated from the map at Appendix 1 and verified with the map dated 1994 submitted from the company to BLM. The resulting lengths are as listed in Table 4. The lengths for DWG.'s 1,2 and 4 were measured by vehicle mileage at 0.1 miles, 0.2 miles and 1.65 miles respectively.

TABLE 4.

Total Length of Dikes (feet)		
Type		Dikes
Entering Dunes	(DWG #1)	530
Between Dunes	(DWG #2)	1,060
Pond 5 North Dike	(DWG #3)	5,000
E. end Dunes	(DWG #4)	6,400
N. Dike Pond 0	(DWG #5)	21,000
W. Dike Pond 0	(DWG #6)	40,000
Pond 0 Sep.	(DWG #7)	2,500
Pond 1 W. Dike	(DWG #8)	7,500
Pond 1 S. Dike	(DWG #9)	13,700
Finished Brine North	(DWG #10)	4,900
Pond 7D,C &B S Dike	(DWG #11)	7,500
Pond 7D W Dike	(DWG #12)	13,500
Pond 7D N Dike	(DWG #13)	7,500
Pond 7D NE Dike	(DWG #13)	4,000
Pond 5 SW Dike	(DWG #16)	1,300
Total		136,390

The length of each dike was then multiplied by their average cross sectional area. These areas for the dikes were measured and the following area were derived based upon actual field calculations. The cross-sectional diagrams are in Appendix 7.

Once this calculation is carried out, the resulting figure is the cubic feet of material that must be relocated. This figure was then converted into cubic yards using the following equation:

$$ft^3/27 = yd^3$$

where:
yd^3 = Cubic Yards of material
ft^3 = Cubic feet of material
The cubic yardage of material to be moved is summarized in Table 5.

TABLE 5.

Cubic yards of Exterior Dikes to be graded by a dozer (yd3)			
Type	Area (ft^2)	Length (ft)	(yd^3)
Entering Dunes (DWG #1)	102	530	2,002
Between Dunes (DWG #2)	73	1,060	2,866
Pond 5 North Dike (DWG #3)	476	5,000	88,148
E. end Dunes (DWG #4)	265	6,400	62,815
N. Dike Pond 0 (DWG #5)	222	21,000	172,667
W. Dike Pond 0 (DWG #6)	240	40,000	355,556
Pond 0 Separation (DWG #7)	218	2,500	20,185
Pond 1 W. Dike (DWG #8)	327	7,500	90,833
Pond 1 S. Dike (DWG #9)	189	13,700	95,900
Finished Brine North (DWG #10)	220	4,900	39,926
Pond 7D,C &B S Dike (DWG #11)	929	7,500	258,056
Pond 7D,C & B W Dike (DWG #12)	348	13,500	174,000
Pond 7D N Dike (DWG #13)	175	7,500	48,611
Pond 7A & B NE Dike (DWG #13)	73	4,000	10,815
Pond 5 SW Dike (DWG #16)	333	1,300	16,033
P2 Cast up material*			40,000
Grand Total Numbers may not add because of rounding		136,390	1,478,413

*See Appendix 2

Equipment Selection (Exterior Dike):

Equipment selection is limited by the load bearing capacity of the material surface. In a study performed by the Utah State Department of Highway in cooperation with the Bureau of Public Roads on the immediate surroundings, unconfined compression tests determined the load bearing capacity of the material to be 10 psi. The reference page from the report can be viewed in Appendix 19. John Condas at Gilbert & Western [the company that constructed the facility] was contacted by J. Kohler of this office on 9 November 1999 and he stated that they used 8 psi for equipment loading considerations. Referencing to Caterpillar's Performance Handbook (30th Anniversary Edition), it was determined that the D7R-LGP is the highest production dozer that could be used. This dozer has an applied stress of less than 7 psi on the material, which is a reasonable 3 psi less than the suggested limit. The D8, D9N, D10N and the D11N dozers all apply loads of 14.3 psi or higher which eliminates them from consideration. A D8LGP was reviewed and with a universal blade the dozer applied a load of 9.03 psi which is above the 8 psi used by Gilbert and Western in

the original construction. Contact was made with Wheeler Machinery (4901 West 2100 South, Salt Lake City, Utah, 801-908-8900) and they stated that they did not have a D8LGP in the rental fleet and that it was only available for purchase. For these two reasons the D8LGP was removed from consideration and a D7RLGP was chosen.

In this section the overall weight of the dozer and the ground contact area of the dozer shoe were given and can be viewed in Appendix 8 page 1-11 and 1-46. Using these two parameters, the load per square inch applied by the dozer on the material was calculated by using the relationship:

D7R-LGP

$$\sigma'_d = W_d/A_d$$

where:
σ_d = Stress applied by the dozer on the material (psi) 7.69
W_d = Weight of the dozer plus the blade (lbs)
A_d = Dozer shoe ground contact area (sq. in.)

$$\sigma'_d = \mathbf{60{,}300}\text{ lbs.} + \mathbf{8624}\text{ lbs.} / \mathbf{8624}\text{ in}^2 = \mathbf{7.69\ psi}$$

Production Rate of the Equipment:

The production rate of the D7R LGP was calculated using the Caterpillar Performance Handbook, Bulldozer Section, page 1-52. Page 1-52 shows the graph of the production using a universal blade vs. dozing distance and page 1-55 is a step by step explanation on how to use the graph to estimate the actual production of the dozer, taking into account site specific factors. Both of these pages can be inspected in Appendix 9.

The average push is understood to be 213 feet derived from a weighted average of push distance and volumes based on drawings completed for the reclamation of the dikes (See Appendix 18)

The following is a direct accounting for each correction factor used in the production rate calculation.

Correction Factors:

1. Operator **(O)**: Assuming that the operator will be average, the suggested correction factor is 0.75

2. Material **(M)**: The material should be easy to cut but the ground is questionable. A correction factor is 0.8 has been applied

3. Job Efficiency **(E_j)**: The operator will be in charge of general maintenance of the dozer (lube, oil, filter). Taking this factor into account, along with startup time, breaks and miscellaneous delays, an efficiency of 50 min/hr is estimated. The suggested correction factor is 0.83

4. Material density **(D_m)**: The material to be moved can be characterized about half dirt and half rock. Generally, 50% rock and 50% dirt has a density of 2900 lbs/yd^3 which is found in Appendix 6. The suggested correction factor is 2700 lb./LCY/2900 lb./LCY for a factor of 0.93.

5. The uncorrected Hourly Production **(P_u)**: (graph in Appendix 5, Item E) = 380 LCY/Hr for a D7R series.

Using these correction factors, the actual production is calculated as follows:

Production Rate = (O)* (M)*(E_j)*(D_m) *(P_u) = (.75)*(.80)*(.83)*(.93)*(380 yd^3/hr)

The resulting site specific **Production Rate is 176** yd^3 per hr.

Exterior Dike Reclamation Time:

Due too extremely wet conditions during late fall, early spring and winter, six months will be considered the number of working months per year. This affects the number of mobilizations that will take place and will directly affect the cost as will be shown later. The operator will not work Saturday or Sunday. He will be paid for The shifts will be 8 hour shifts, 5 days per week or on a monthly basis it will be 173 hrs per month. This is calculated using the following relationship:

$$T=(D - W/12)*8$$

where
T = Total Hours per month
D = Days per year (364)
W = Days in weekends per year (104)
12 = Months per year
8 = Working hours per day

T = ((**364** days per year-**104** weekend days per year) /**12** months per year)* **8** hours per day

T = 173 hrs per month

The operators will be paid 60 hrs per month at 1.5 times the pay rate to compensate for the 10 holidays and 10 days of paid vacation. (This would equate to 1.7 days per month).

$$Otd = (10 +10)/12$$

Otd = Overtime Days
10 = 10 holidays
10 = 10 vacation days
12 = months per year

Otd = (**10** holidays per year + **10** vacation days per year / **12** months per year
Otd = 1.7 days per year

Knowing the production rate per working hour, the monthly production rate of the dozer can be calculated. This was accomplished by using the relationship:

$$P_m = H_w * P_h$$

where:

P_m = Monthly Production rates
H_w = Working Hours per Month
P_h = Hourly Production rates

P_m = **173** hr/month * **176** yd^3/hr

This calculation results in a monthly production rate of P_m = **30,447** yd^3per month.

Next, the total number of working months to complete the job can be calculated using the relationship:

$$M_t = Y_t / P_m$$

where:

M_t = Total Number of Months to Complete the Job
Y_t = Total cubic Yardage to be Moved
P_m = Monthly Production Rate

$$M_t = 1{,}478413 \text{ yd}^3 / 30{,}447 \text{ yd}^3 \text{ per month}$$

The total number of months it will take to complete the job will approximate $M_t = 48.6$ months on the property for the D7R LGP dozer to complete the work required for reclamation.

Exterior Dike Reclamation Costs:

Operating Costs

The operating costs were taken from the Machinery Information Division of PRIMEDIA Information Inc. Rental rate Blue Book Volume I page 9-45. They are $33.50 times a Utah factor of 0.865 which equates too $28.98 per hour. This can be viewed in Appendix 10.

The resulting costs are as follows:

$$O_{tc} = (173 * E_j) * O_c$$

where:

O_{tc} = Total Monthly Operating Costs
E_j = Operator Efficiency that was calculated in the Production Rate calculation above. In other words this is the only amount of time that the equipment will be operating. This is 0.83 or 50 minutes out of one hour.
173 = Number of work hours in a work month
O_c = Operating Costs ($28.98 per hour)

$$O_{tc} = (173 \text{ hrs. per month} * .83) * \$28.98 \text{ per hour}$$

This results in an operating cost for the dozer of O_{tc} = **$4,161** per month.

Equipment Rental Rates, Mobilization and Insurance:

The local Caterpillar distributor, Wheeler Machinery, was consulted for rental rates. They are located at 4901 West 2100 South, West Valley City. Their rental rate as per 2 Jan 2001 was $10,800 per month. This rate includes discounts for long term rental. Anything more than 176 hours is an additional cost but currently this project is estimated at 173 working hours per month so the regular rate with the discount will be employed for cost purposes. Insurance is $928 per month. Wheeler Machinery charges a $336 mobilization fee for projects located within a 2-hour drive of their office. This mobilization fee will apply over 6 months.

The equipment cost for this project is derived as follows:

$$E_r = (D_r) + ((M_r * 2)/6) + I_r$$

where:
E_r is the monthly Equipment rate
D_r = D7 Dozer Rate: $10,800/month
M_r = Mobilization Rate per event: $336
I_r = Insurance Rate: $928/month
2 = Number of times per year that mobilization will occur
6 = Number of actual work months

$$E_r = (\$10{,}800/\text{month}) + ((\$336 * 2)/6) + \$928/\text{month}$$

This results in a monthly equipment rental rate of E_r = **$11,840** per month.

This concurs well with the figure in the Machinery Information Division of PRIMEDIA Information Inc. For 3Q 2000, Rental Rate Blue Book Volume I, P. 9-45. Which lists the D7R-LGP for $12,790 per month times the Utah Factor of 0.865 = $11,063 per month not including mobilization and insurance.

Operators' wages (including fringes)

If the government was to contract out this effort, Davis-Bacon Act wages would have to be used. These wages for a dozer operator in Tooele County for 9/29/00 are found in Appendix 11. These include fringe benefits. The cost was formalized by the following correlation:

$$O_w = O_r * 173 + 1.7*\$27.23 *1.5)$$

where:

O_r = Operator wage rates of $20.15 + 7.08 = $27.23 (Appendix 8)

173 = Number of work hours per month

1.65*$27.23 * 1.5 = Holiday and Vacation pay

O_w = **$27.23** per hour * **173** hrs per month + **1.7** days per month * **$27.23** per hour ***1.5**)

This results in a monthly Operator rate of O_w = **$4780** per month.

Travel Cost

Because of the remoteness of the project location, travel compensation will be necessary. This rate is set $0.30 per mile. The weekly travel estimates for the operator will ($0.30/mile * 5 days per week * 180 miles per day) for traveling on the weekdays. There will also be an allowance for travel of a supervisor to inspect the job progress once every two weeks. The traveling distance covered will be 180 miles round trip. This is sufficient for travel to and from Salt Lake City, Utah. All federal documents related to the per diem can be viewed in Appendix 12.

The overall amount for travel will be calculated using the following relations:

1 month = 9⅓ weekend days

1 month = 21 ⅔ working days (173 hrs per month)

This was calculated as follows:

$$T_c = O_t + S_t + O_p + S_p + Tp$$

$$O_t = (M_r * O_m) * 4.3$$
$$S_t = (M_r * S_m) * 4.3$$

where:

O_t = Operator Travel Costs

S_t = Supervisor Travel Costs

O_p = Operator Perdiem Costs = $0.00 because mileage is paid on a daily basis

S_p = Supervisor Perdiem Costs = $0.00 because mileage is paid on a daily basis

M_r = Mileage Rate of $0.30 per mile

O_m = Operator weekly mileage of 900

S_m = Supervisor weekly mileage of 90 (or 360 for the month)

D_r = Perdiem Rate of $00 per day

21.67 = Number of working days per month

2 = Number of supervisor days per month

Tp = Travel pay 4 hrs/day times 21.67 days/Mo times $27.23/ hr = $2360/ mo. The 4 hrs per day is for travel 2 hours each way to the site. In other words the operator will be paid for 12 hours per day. The mileage rate for the vehicle is for the amortization for the vehicle only.

T_c = ($.30 * 900)* 4.3 + ($.30 * 90)*4.3 + 0 + 0 + $2360 =
The monthly travel costs equated to T_c = **$3637** per month.

Summary of Exterior Dike Reclamation Costs:
The following is a summary of all the costs included in the bond calculation:

Contractor Overhead and Profit
Means Facilities Construction Cost Data (1998) recommends a 20% increase to the total cost for the contractors overhead and profit. The reference page of cost data can be viewed in Appendix 13.

Contingencies
Means Facilities Construction cost Data (1998) recommends a 10% increase to the total cost for the contingencies in final working drawing stage. The reference page of cost data can be viewed in Appendix 5.

Administrative Costs
The Washington Office guidance is to apply 18%overhead on all projects dealing with 5XXX category. This project will be considered a 5XXX project. For the reference pages see Appendix 6.

TABLE 6.

Summary of Exterior Dike Reclamation Costs		
Type	**Cost** ($/Month)	Cost Cumm ($/Month)
Operating	$4,161	$4,161
Equipment	$11,840	$16,001
Operator	$4,780	$20,781
Travel	$3,637	$24,418
Subtotal direct costs	$24,418	**$24,418**
Contractor Overhead & Profit (20%)	$4,884	$29,302
Contingency (10%)	$2,442	$31,743
Subtotal of all costs		$31,743
Administrative (18% of all costs)	$5,714	**$37,457**
Months	48.60	$1,820,421
Total Cost ($2000) Numbers may not add because of rounding	1.00	**$1,820,421**

7 SYSTEM POND INTERIOR DIKES AND MAGNESIUM CHLORIDE STORAGE PONDS:

The standard for the salt industry for maintaining the salt in a form that contains the least amount of contaminants is that the ponds are lined with salt. This ensures the fact that erosion of the dikes in the ponds does not bring foreign material into the salt. This also demands a maintenance procedure be put in place to keep the salt liner in-tact during operations. In order to keep the amount of dirt, clay and other foreign material to a minimum and to maintain the salt in the ponds as potentially extractable, BLM has chosen to require the operator to remove the interior dikes in the Pond 7 system. This will help keep the contamination of the salt to a minimum. The excess material will be removed to Pond 1 and spread on top of the salt in this pond which may not be extractable because of salt thickness necessary to support equipment. The Magnesium Chloride Storage Ponds are actually used as salt precipitation ponds rather than storage ponds. Because the South Pond has been compromised, the best recommendation is to remove the pond contents and the dike to the area of Pond 1. This will allow the salts in pond 1 to return back to the ground water more easily, where they may be recovered at a later time. The north storage pond can be covered with material from the Pond 7 system dikes and berms to stabilize the surface. Physical safety, preservation of the resource and long-term stability are key to this effort.

The total length of ditches and baffles were approximated from the map at Appendix 1 and verified with the map dated 1994 submitted from the company to BLM. Volumes were estimated using the resulting lengths which are as listed in Table 7.

TABLE 7.

Total Length of Dikes (feet)		
Type		Dikes
Pond 7a-7b and 7b-7c	(DOG #15)	51,000
Finished Brine South	(DOG #14)	2,400
Grand Total Numbers may not add because of rounding		53,400

The length of each ditch was then multiplied by the average cross sectional area. These areas for the berms were measured and the following areas were derived based upon actual field calculations . . . The diagrams are in Appendix 2.

Once this calculation is carried out, the resulting figure is the cubic feet of material that must be relocated. This figure was then converted into cubic yards using the following equation:

$$ft^3/27 = yd^3$$

where:
yd^3 = Cubic Yards of material
ft^3 = Cubic feet of material
The cubic yardage of material to be moved is summarized in Table 8.

TABLE 8.

Cubic yards of material to be moved by a Wheeled Tractor (yd3)			
Type	Area (ft^2)	Length (ft)	(yd^3)
Pond 7a-7b and 7b-7c (DWG #15)	50	51,000	94,444
Finished Brine South (DWG #2)	7,200	2,400	640,000
Grand Total Numbers may not add because of rounding			734,444

Equipment Selection:

Equipment selection was a CAT 631E or equivalent. This is a self loading scraper. Again the Caterpillar Handbook 30th edition (October 1999) was used for cost estimation purposes. The haul distance would be approximately 4,800 feet to Pond 1. This number was derived from taking the weighted average of 94,444 yd^3 at 17,000 feet and 640,000 yd^3 at 3,000 feet which are the approximate haul distances. From page 9-42 and 9-43 the haul time for approximately 4,800 feet is 1.8 minutes loaded and about 1.8 minutes empty. In addition to the scraper a dozer would be necessary. We will plan on using the D7RLGP dozer for pushing the material around and ensuring proper distribution.

From page 9-11, Appendix 14, the cycle time is estimated by $\mathbf{C_t} = \mathbf{L_t} + \mathbf{H_t} + \mathbf{S_t} + \mathbf{R_t}$.
$\mathbf{C_t}$ = Cycle Time
$\mathbf{L_t}$ = The fixed load time for a 631E with Auger is 1.8 minutes. See page 9-42, Appendix 14.
$\mathbf{H_t}$ = Haul time
$\mathbf{S_t}$ = The spread and maneuver time is 0.7 minutes. It is understood that the grade is 0% and the rolling resistance is minimal. See page 9-11, Appendix 14.
$\mathbf{R_t}$ = Return time unloaded for a 631E with Auger is 1.8 minutes. See page 9-43, Appendix 14.

$$\mathbf{C_t} = \mathbf{0.9}\text{ min} + \mathbf{1.8}\text{ min} + \mathbf{0.7}\text{ min} + \mathbf{1.8}\text{ min}.$$

$\mathbf{C_t} = \mathbf{5.0}$ minutes
In this case the total cycle time would be 12 trips per hour.

The machine is limited to 31 yd^3 heaped at 100% efficiency. The operation is expected to operate at 83% efficiency (50 minutes per hour) because the operator will have to take breaks, and maintain the equipment which will reduce the tonnage to 23.25 yd^3. The total time that is necessary to move 734,444 yd^3 at 31 yd^3/trip and 12 trips per hour at 83% efficiency is 2379 hrs. The number of months that it would take to do this job is estimated by dividing 2379 hrs by 173 hrs per month. This equates to 13.7 months.

A wheel scraper in a moderate to average work conditions has a life of 22,000 to 17,000 hours (Appendix 14, P. 22-71), therefore only requiring the equipment for approximately 10% of that time for this estimate we will rent the equipment. We contacted Wheeler Machinery on 3 January 2001 and they quoted an equipment rental for this piece of equipment of $17,000 per month and an additional $1635 per month for insurance. The operating cost was estimated from the Machinery Information Division of PRIMEDIA Information Inc. Rental rate Blue Book, Vol. I, P. 9-39 (Appendix 14) at $72.35 per hour times the Utah factor of 0.865 which equates too $62.58 per hour.

Production Rate of the Equipment:

The production rate of the Wheeled Tractor 631E series is taken from Appendix 15, page 9-5. The

machine is limited to 31 yd^3 when it is heaped.

The uncorrected Hourly Production (P_u) = **12** Trips per hour * **31** yds. per trip

P_u = **372** yd^3 per hr at 100% efficiency.

Correction Factors:
Job Efficiency (E_j): The operator will be in charge of general maintenance of the equipment (lube, oil, filter). Taking this factor into account, along with startup time, breaks and miscellaneous delays, the efficiency of 50 min/hr is estimated. The suggested correction factor is 0.83.

Using these correction factors, the actual production is calculated as follows:
Production Rate = $(E_j)*(P_u)$ = (.83)*(372)yd^3 per hour

The resulting site specific **Production Rate is 309** yd^3 per hr.

Reclamation Time: This affects the number of mobilizations that will take place and will directly affect the cost as will be shown later. The operator will not work Saturday or Sunday. The shifts will be 8 hours shifts, 5 days per week. Taking into account, these constraints, there will be 173 working hours per month. Knowing the production rate per working hour, the monthly production rate of the scraper can be calculated.

$$P_m = H_w * P_h$$

where:
P_m = Monthly Production rate
H_w = Working Hours per Month
P_h = Hourly Production rates

P_m = **173** hrs per month ***309** yd^3 per hr.

This calculation results in a monthly production rate of P_m = **53,457** yd^3 per month.

Next, the total number of working months to complete the job can be calculated using the relationship:

$$M_t = Y_t / P_m$$

where:
M_t = Total Number of Months to Complete the Job
Y_t = Total cubic Yardage to be Moved
P_m = Monthly Production Rate

M_t = **734,444** yd^3 / **53,457** yd^3 per month

The total number of months it will take to complete the job will approximate M_t = **13.7** months on the MagCorp Knolls Facility for the Wheel Tractor-Scraper to complete the work required for reclamation.

Reclamation costs:

Operating Costs

The operating cost was taken from the Machinery Information Division of Prime MEDIA Information Inc. Rental rate Blue Book Volume I page 9-45. They are $72.35 times a Utah factor of 0.865 which equates too $62.58 per hour. This can be viewed in Appendix 10.

The resulting costs are as follows:

$$O_{tc} = (173 * E_j) *$$

where:

O_{tc} = Total Monthly Operating Costs
E_j = Operator Efficiency that was calculated in the Production Rate calculation above. In other words this is the only amount of time that the equipment will be operating. This is equal to 0.83
173 = Number of work hours in a work month
O_c = Operating Costs ($62.58 per hour)

$$O_{tc} = (173 \text{ hrs. per month} * .83) * \$62.58 \text{ per hour}$$

This results in an operating cost for the dozer of O_{tc} = **$8986** per month.

Operator's wages (including fringes)

If the government was to contract out this effort, Davis-Bacon Act wages would have to be used. These wages for a dozer operator in Tooele County for 1996 are found in Appendix 11. These include fringe benefits. The cost was formalized by the following correlation:

$$O_w = O_r * 173 + 1.7 * \$27.23 * 1.5)$$

where:

O_r = Operator wage rates of $20.15 + 7.08 = $27.23 (Appendix 8)
173 = Number of work hours per month
1.65*$27.23 * 1.5 = Holiday and Vacation pay per month

$$O_w = \$27.23 \text{ per hour} * 173 \text{ hrs per month} + 1.7 \text{ days per month} * \$27.23 \text{ per hour} * 1.5)$$

This results in a monthly Operator rate of O_w = **$4778** per month.

Travel Cost

Because of the remoteness of the project location, travel compensation will be necessary. This rate is set $0.30 per mile. The weekly travel estimate for the operator will ($0.30/mile * 900 miles) for traveling on the weekends. There will also be an allowance for travel of a supervisor to inspect the job progress once every two weeks. The traveling distance covered will be 180 miles round trip. This is sufficient for travel to and from Salt Lake City, Utah. All federal documents related to the per diem can be viewed in Appendix 12.

The overall amount for travel will be calculated using the following relations:

1 month = 8⅓ weekend days
1 month = 21 ⅔ working days (173 hrs per month)
This was calculated as follows:

$$T_c = O_t + S_t + O_p + S_p + Tp$$

$$O_t = (M_r * O_m) * 4.3$$
$$S_t = (M_r * S_m) * 4.3$$

where:

O_t = Operator Travel Costs
S_t = Supervisor Travel Costs

O_p = Operator per diem Costs
S_p = Supervisor per diem Costs
M_r = Mileage Rate of $0.30 per mile
O_m = Operator weekly mileage of 900
S_m = Supervisor weekly mileage of 90 (or 360 for the month)
D_r = per diem Rate of $00 per day
21.67 = Number of working days per month
0 = Number of supervisor days per month. Supervisors cost has been charged to the Dozer Cost.
Tp = Travel pay 4 hrs/day times 21.67 days/Mo times $25.75/ hr = $2232/ mo
T_c = ($.30 * 900)* 4.3 + 0 + 0 + 0 + $2232 =
The monthly travel costs equated to T_c = **$3393** per month.

Summary of Interior Dike and Brine Storage Reclamation Costs:

The following is a summary of all the costs included in the bond calculation:

Contractor Overhead and Profit

Means Facilities Construction Cost Data recommends a 20% increase to the total cost for the contractors overhead and profit. The reference page of cost data can be viewed in Appendix 13.

Contingencies

Means Facilities Construction cost Data recommends a 10% increase to the total cost for the contingencies in final working drawing stage. The reference pate of cost data can be viewed in Appendix 5.

Administrative Costs

The Washington Office guidance is to apply 18%overhead on all projects dealing with 5XXX category. This project will be considered a 5XXX project. For the reference pages see Appendix 6.

TABLE 9.

Summary of Interior Dike and South Brine Storage Reclamation Costs		
Type	**Cost** ($/Month)	Cost Cumm ($/Month)
Operating	$8,986	$8,986
Equipment	$18,635	$27,621
Operator	$4,780	$32,401
Travel	$3,393	$35,794
Subtotal Direct Costs	$35,794	**$35,794**
Overhead & Profit (20%)	$7,159	$42,953
Contingency (10%)	$3,579	$46,532
Subtotal all costs		**$46,532**
Administrative (18%) of all costs	$8,376	$54,908
Months	13.70	$752,240
Total Scraper Cost	1.00	**$752,240**
Dozer Cost D7RLGP ($37,454/mo)	13.70	$513,120
Grand Total Interior Dike Reclamation ($2000) Numbers may not add because of rounding		**$1,265,359**

Road Reclamation.
Rational. Because of the small amount of annual rain fall 6.44" (Averaged from Weather Station, Knolls 10NE from 1986 to 1995) it will be necessary to rip and plant the areas that have been disturbed in the dune area because the area will have a difficult time reestablishing the plant growth. It has been determined that a polypropylene mesh would be necessary in order to stabilize the ground so the seeds and the material would not blow away.

There are numerous roads that will require reclamation. The summation is contained in Table 10.

The cost was determined by using $160 per acre for mulch, $170 per acre for re-seeding and $220 per acre for ripping. This totals $550 per acre. These costs were obtained from the Utah Division of Oil, Gas and Mining and found in Appendix 20. A stabilizer from the Means Cost Estimating Guide1998, page 57, Appendix 16 Item 704-0200, polypropylene mesh at $1.96 per square yard was used.

TABLE 10.

Road Reclamation (ft)			
Type	Width (ft)	Length (ft)	(ft^2)
Dunes	15	20,000	300,000
North Dike Roads	15	16,000	240,000
Roads to the Facility	15	6,000	90,000
Grand Total			630,000
Acres		14.5	
	Cost/Unit	**Acres**	**Total cost**
Cost of Ripping and re-seeding per acre	$550	14.5	$7,975
Cost of Stabilizer and installation per yd^2	$1.96	14.5	$137,553
Subtotal Direct Costs			**$145,528**
		Cost	**Cost Cumm**
OH & Profit 20%		$29,106	$174,633
Contingency 10%		$14,553	$189,186
Subtotal All Costs			**$189,186**
Administrative 18% of all costs		$34,054	$223,240
Total Cost **Numbers may not add because of rounding**			**$223,240**

Calculation for cost of stabilizer and installation per yd^2
9 ft^2 per yd^2
43,560 ft^2 per acre
43,560 ft^2 per acre / 9 ft^2 per yd^2 = 4840 yd^2 per acre
4840 yd^2 per acre * 14.5 acres *$1.96 per yd^2 = $137,553

Facilities and Pump Stations
Rational: The facilities and pump stations and man-made structures will be required to be removed in order to remove physical safety hazards and to return the area back to a more natural condition.

The facilities and pump stations that will be included in this analysis will consist of the following items:

1. P1 Pump station, outlet structure, diesel tank and aqueduct.
2. P2 Pump station and outlet structure
3. Gate structure at Pond 0
4. Warehouse building
5. P7 Pump Station

6. Pump stations at brine storage facilities
7. Final Brine pump station and sump
8. Wells
9. Pipe at P2 feed ditch
10. Gates in the Pond 7 system

TABLE 11.

Facility Reclamation				
Type	Sq ft	Cost/ ft^2	Total Cost	Estimation
P1 Pump Station (Concrete)	384	$20.54	$7,887	Note 1
P1, P2, P3, P4 & P5 Pump Stations P2 Feed Ditch pipe Building (steel)	6	$4,800.00	$28,800	Note 2
P1 Diesel Tank and Diesel Tank @ Building, and large tank at building	3	$899.00	$2,697	Note 3
P1 Outlet Structure (Concrete)	400	$20.54	$8,216	Note 4
P2 Outlet Structure (Concrete)	200	$20.54	$4,108	Note 5
Gates: Pond 5A, 5B, 7B, 7C, 7D	1,000	$20.54	$20,540	Note 6
Pond 0 Gate	1,080	$20.54	$22,183	Note 7
Finished Brine Sump	1,350	$20.54	$27,729	Note 8
Building (Concrete)	1,000	$8.07	$8,070	Note 9
Warehouse	1	$8,400.00	$8,400	Note 10
Well	1	$500.00	$500	Note 11
Total			$139,131	
OH & Profit 0% Included in costs from Means Estimating Guide			$139,131	
Contingency 10%			$153,044	
Administrative 18%			$180,591	
Total Cost Numbers may not add because of rounding			**$180,591**	

The $20.54 per square foot was derived using the Means Cost Estimating Guide for 1998 (page 39, Appendix 16) Concrete Removal. Plain concrete is figured at $12.80 per ft^2 (Item 754-2440) and then add 20% (Item 754-2620) for heavy reinforcing. This brings the cost to $15.30. Then haulage disposal was calculated at $0.37 per sq ft @ 10 inches thick per 5 miles.

$0.37 per sq ft haulage cost was determined as follows:
$12.10/yd^3 = $12.10 per 46,656 in^3 (Appendix 16, page 39, Item 754-4250)
$12.1 / 46,656 in^3 = $0.000259 per in^3 = $0.00259 per in^2 per 10" thick piece
$0.00259 per in^2 per 10" thick piece * 144 in^2 per ft^2 = $0.37 per ft^2 per 10" thick
A round trip to USPCI site and back would be about 30 miles (or 6 times $0.37 would be $2.24).

Disposal costs would be $60 per ton (page 30, Item 612-0100) That equates to $3.75 per sq ft @ 10" thick.
Concrete weight 120 lbs/ft^3

2000 lbs per ton / 120 lbs per ft^3 = 16.66 ft^3 per ton
$60 per ton / 16.66 ft^3 per ton = $4.50 per ft^3
$3.60 per ft^3 / 1728 ft^3 per in^3 = $0.002084 per in^3
$0.002605 per in^3 * 10 = $0.02084 per in^2 per 10in thick
$0.02084 per in^2 * 144 in^2 per ft^2 = $3.00 per ft^2 per 10in thick

Therefore the total cost would be $15.30 + $2.24 = $17.54 + $3.00 = $20.54

Company would not provide drawings.
Note 1. 384 sq ft was estimated using 24 columns times 4 sq ft at 10 inches thick

Note 2. Would be similar to Single family wood house demolition (Maximum $4800 each, times 6 sites. See 604-1020 on page 30, Appendix 16)

Note 3. These would be equivalent to underground petroleum storage tank removal item 880-0110 page 43 Appendix 16. These tanks are not underground but footings and foundations would have to be removed therefore it is assumed to be an equivalent cost because we have no drawings. There are 3 tanks. Item 880-1023 for moving the tank is $600 for 100 miles or $6.00 per mile. At 30 miles this would be $180 per tank. For 3 tanks this would be $540. Item 880-0300 demands a cost to remove sludge and water remaining in the bottom of the tank. This would be $179 per tank. Total Cost per tank would be $480 for removal plus $180 for haulage and $179 for product removal and an estimated $60 each for disposal costs. This would total $899 for each tank.

Note 4. Estimated to be 20' by 20'

Note 5. Estimated to be 20' X 10'

Note 6. Each gate was estimated to be 10' X 5' and there are 4 sides which equals 200 sq ft each, There are 5 gates for a total of 1000 sq ft at 10" thick.

Note 7. The gate was estimated to be 20' X 15' top and bottom for a sq footage of 600 sq ft. There are 2 sides and 2 supports both estimated at 15' X 8' for a total of 480 sq ft. Grand total is 1080 sq ft at 10" thick.

Note 8. The sump is estimated at 15' X 15' for a total of 225 sq ft. There are 5 sides and a top for a total of 6 sides. This equates to 1350 sq ft

Note 9. The concrete for the building and the pad was estimated at 100' X 100' by 6" thick Slab on grade, reinforced with wire mesh was $4.51 per sq ft. (Item 754-0420 page 39, Appendix 16). The cost for disposal

is \$4.50 per ft^3 or \$1.80 per ft^2 per 6inches thick.(see calculation above for disposal cost)

Haul cost would be
\$0.22 per sq ft haulage cost was determined as follows:
\$12.10/yd^3 = \$12.10 per 46,656 in^3 (Appendix 16, page 39, element code 754-4250)
\$12.1 / 46,656 in^3 = \$0.000259 per in^3 = \$0.001554 per in^2 per 6" thick piece
\$0.00154 per in^2 per 6" thick piece * 144 in^2 per ft^2 = \$0.22 per ft^2 per 6" thick
A round trip to USPCI site and back would be about 30 miles (or 6 times \$0.22 would be \$1.32.
Total cost would be \$4.50 + \$1.80 + \$1.32 = \$8.07 per sq ft per 6 inches thick

Note 10. Warehouse was estimated as a three family, three story house at a maximum rate of \$8400. See Item 604-1320, page 30, Appendix 16.

Note 11. Estimate to plug, and remove casing on the well. No depth known

Survey Monuments. The Right-of-way specifically states that all survey monuments shall be re-established. It is unknown how many this may include. Because the ponds are now filled with salt in many of the areas, the survey monuments will have to be re-established in these areas. After consulting with the surveyors in the Utah State Office it was felt that between \$80,000 and \$100,000 would be adequate to cover the costs. The 2% of the total cost was then back calculated to arrive at this number. This is assumed to be accomplished by the Government surveyors and therefore there would be no indirect costs (Overhead and Profit, Contingency and Administrative Costs).

BLM Contracted Oversight Costs
TABLE 12

BLM Contracted Oversight Costs			
Type	Cost	Number	Cost Cumulative
Government Technical GS-12 Equivalent	\$60,000	3	\$180,000
Government Administrative GS - 9 Equivalent	\$40,000	4	\$160,000
Vehicle	\$30,000	1	\$30,000
Subtotal Direct Costs			**\$370,000**
Over head and Profit (20%)	\$74,000		\$444,000
Contingency (10%)	\$37,000		\$481,000
Subtotal All Costs			**\$481,000**
Administrative Cost (18%) all costs	\$86,580		\$567,580
Total Cost (\$2000) Numbers may not add because of rounding			**\$567,580**

1 Technical person full time for 3 years similar to GS-12, \$60,000 per person per year
1 Administrative Person full time for 3 years plus one year at a GS-9, \$40,000 per person per year
Many different types of positions could qualify for this work. Pay rate is for expertise level.

TOTAL BONDING REQUIREMENTS:

TABLE 13

Grand Total of MagCorp Reclamation Costs		
Type	Cost	Cost Cumulative
Ditches and Ditches	$1,255,619	$1,255,619
Exterior Dikes	$1,820,421	$3,076,040
Interior Dikes and South Brine Storage	$1,265,359	$4,341,399
Facilities and Pumps	$180,591	$4,521,990
Survey monuments 2% of the cost	$90,440	$4,612,430
Road Ripping and Re-seeding	$223,240	$4,835,670
Contract Oversight Cost	$567,580	$5,403,250
Total Cost ($2000)		$5,403,250
Grand Total With Escalation Factor for 5 Years into the future Numbers may not add because of rounding	1.12	**$6,051,640**

Escalation Factor for 5 Years

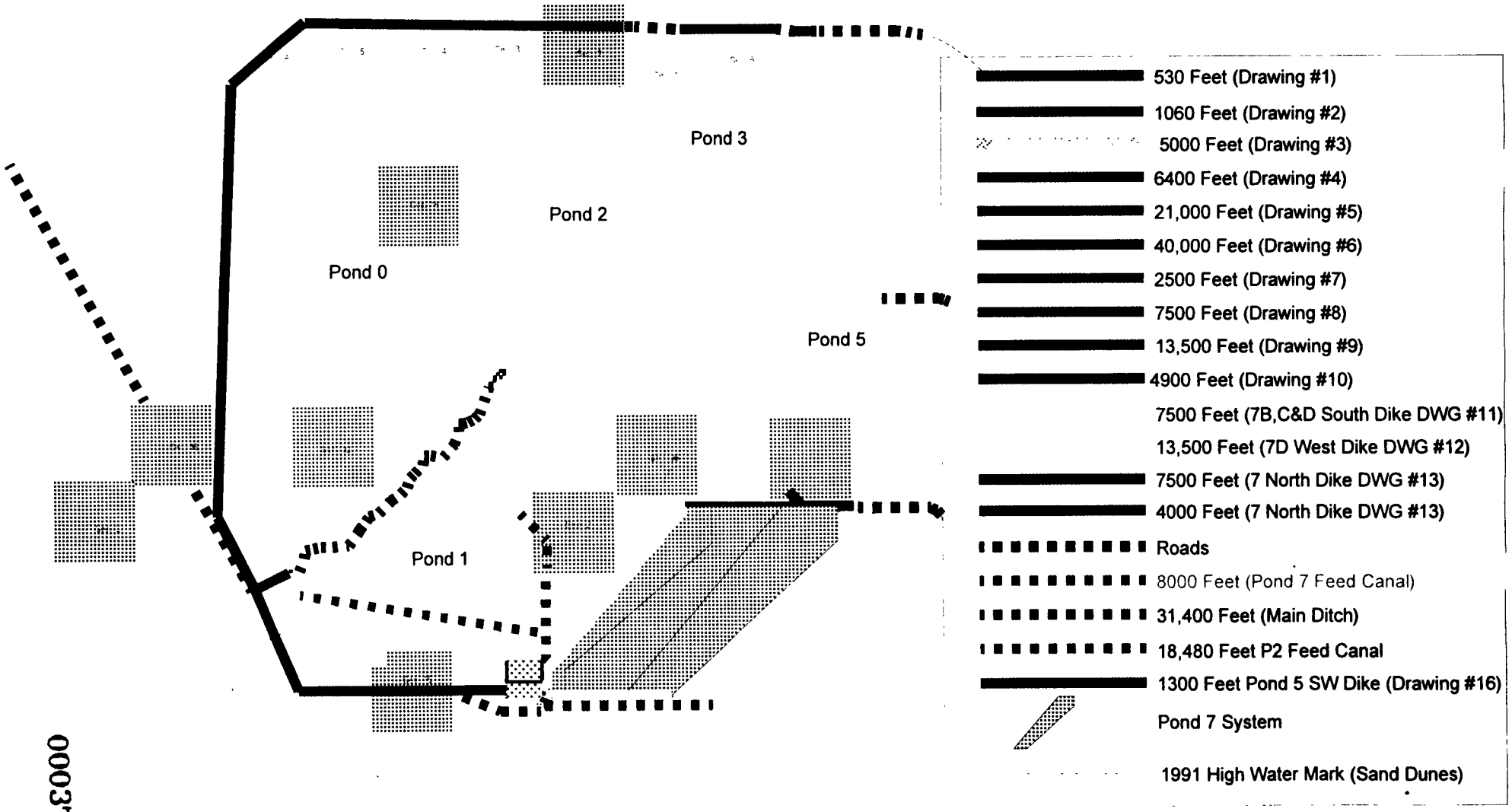
Western Mine Engineering, Mining Cost Service page CL-2 shows a cost index of Construction Labor at 14.73 in 1994 and in March 1999 the index was 16.77. This equates to 14% increase in Construction Labor. Equipment and Machinery increased by 10% over the same period of time. Therefore, we will average them at 12%. The reference page of cost data can be viewed in Appendix 4.

m/045/022

APPENDIX 1

(Map)

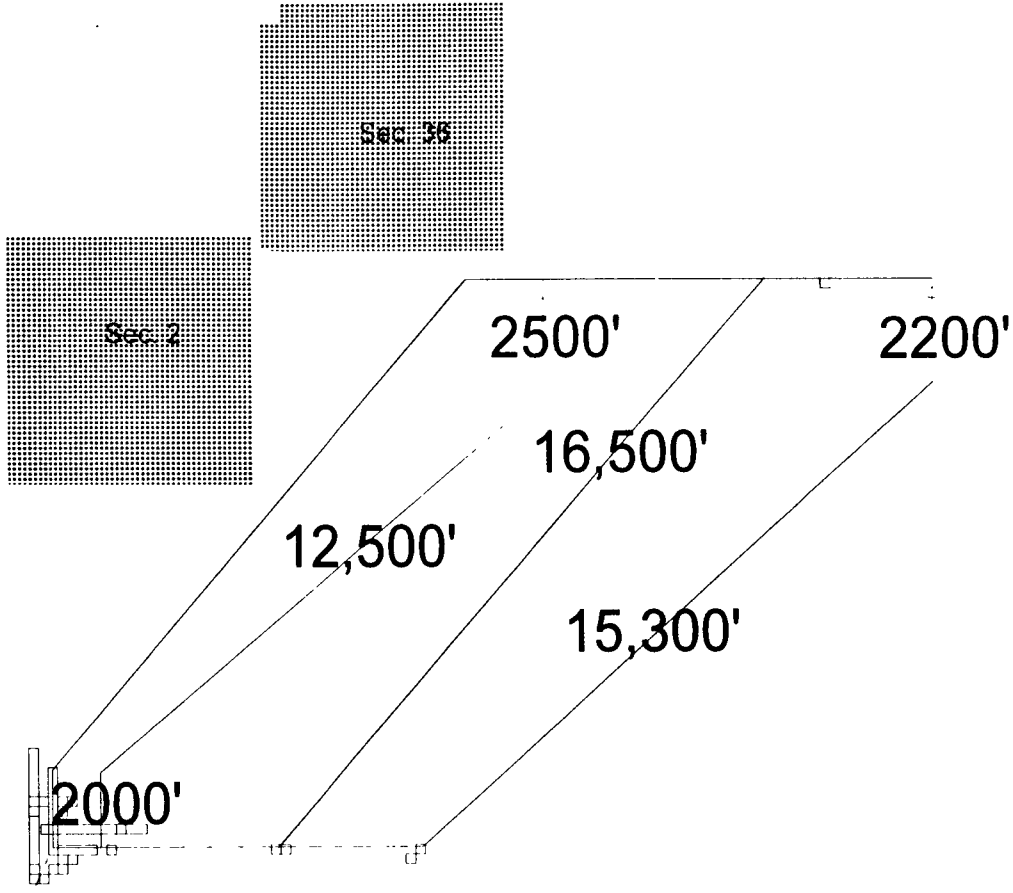
Mag Corp Reclamation Requirements Map



000373

Mag Corp Reclamation Requirements Map

Pond System 7 Length Requirements



APPENDIX 2

(Ditches, Dames and Moore Estimate & UDOGM 1991 Report)

PERKES

GEOTECHNICAL AND CONSTRUCTION COST STUDIES

NEW SOLAR POND FACILITIES

LOCATED ON

WEST DESERT

FOR

AMAX MAGNESIUM, INC.

Dames & Moore

000376

ITEMIZED COST ESTIMATE

ITEM	QUANTITY	UNIT COST	AMOUNT	
1. Canals				
a. Intake canal - cut	550,000cy	$2.25/cy*	$1,238,000	7.12 miles
b. P2 feed canal - cut	38,000cy	1.50/cy	57,000	1.553 miles
- fill (cast-up)	40,000cy	1.50/cy	60,000	
c. 7E feed canal - fill (cast-up)	117,000cy	1.50/cy	176,000	
Subtotal			$1,531,000	
2. Pond Dikes				
a. Pond 1 - South Dike (15,000 LF)				
- sand dune fill	280,000cy			
- imported fill	70,000cy			
b. Pond 1 - Northwest Dike (2,500 LF)				
- cast-up fill	28,000cy			
- imported fill	10,000cy			
c. Pond 3 & 4 - Separation Dike (6,000 LF)				
- sand dune fill	66,000cy			
- imported fill	22,000cy			
d. Pond 3 - North Dike (8,000 LF)				
- cast-up fill	190,000cy			
- imported fill	50,000cy			
e. Pond 7E - West Dike (11,000 LF)				
- cast-up fill	75,000cy			

* Higher unit cost reflects double handling required to pile all excavated material on east side of canal, as a foundation lift for inlet canal dike.

APPENDIX C

PRELIMINARY* COST ESTIMATE

WEST DESERT SOLAR PONDS

FOR AMAX MAGNESIUM, INC.

SUMMARY OF TOTAL COSTS

1.	Direct costs	$12,922,600	
2.	Indirect costs	850,000	
3.	Engineering design	478,000	
4.	Construction management	620,000	
	Project Total (installed cost)*		$14,870,600

SUMMARY OF DIRECT COSTS

1.	Canals	$ 1,531,000
2.	Pond dikes and gates	3,577,000
3.	Reservoirs	2,626,000
4.	Buildings	618,500
5.	Pumps and pump stations	1,234,400
6.	Electrical	2,905,300
7.	Miscellaneous construction	430,400
	Total Direct Costs	$12,922,600

* This preliminary level estimate should not be construed to have an accuracy greater than ± 20 percent. It should be noted that unit costs quoted herein (particularly those related to earthwork operations) may be reduced 10% to 15% if work is initiated in 1987. This is primarily due to the existing favorable economic climate, expected to last through 1987.

SW

FORM MR-AR
(Revised 12/90)

RECEIVED
JAN 22 1991
DIVISION OF
OIL, GAS & MINING

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
Telephone: (801) 538-5340
Fax: (801) 359-3940

ANNUAL REPORT OF MINING OPERATIONS

The informational requirements of this form are based on provisions of the Mined Land Reclamation Act, Title 40-8, Utah Code Annotated 1953, as amended, and the General Rules as promulgated under the Utah Minerals Regulatory Program. An operator conducting mining operations under a Notice of Intention must file an annual operations and progress report (FORM MR-AR) with the Division.

I. GENERAL INFORMATION

1. Report Time Period: From (mo./yr.) 1/90 To (mo./yr.) 12/90

2. DOGM File Number (original notice): M / 045 / 022

3. Mine Name: Knolls Solar Ponds

4. Legal Description (Location of Lands Affected):

Sections	5-8, 17-21, 28-33	Township 1N, Range 12W
Sections	1-36	Township 1N, Range 13W
Sections	14, 23, 25, 26, 36	Township 1N, Range 14W
Sections	4-6, 7-9, 18, 19	Township 1S, Range 12W
Sections	1-18	Township 1S, Range 13W

SLBM, Tooele County, UT

5. Mineral(s) Mined: Magnesium Chloride Brine

6. Name of Operator or Company: Magnesium Corporation of America

7. Permanent Address: 238 North 2200 West
Salt Lake City, Utah 84116

8. Company Representative (or designated operator):

Name: D.H. Wilkinson

Title: President

Address: 238 North 2200 West, Salt Lake City, UT 84116

Phone: (801) 532-2043

☐ Please check if any of the above information has changed since previous year.

II. MINING AND RECLAMATION

1. Was the mine active during the past year? Yes ☒ No ☐

2. If active, how much ore or mineral was mined? 206 million gallons $MgCl_2$ brine.

3. Briefly describe any new or additional surface disturbances that occurred during the past year. This description should include the type of work performed, volume of material moved, and the acreage affected.

A canal was dug to connect P1 pump to P2 canal. The new canal is about 3-1/2 miles long, 30 feet wide and 8 feet deep. Excavated material was used for sidewalls.

4. Briefly describe the reclamation work performed during the past year. This description should include acreage reclaimed, methods employed, and an evaluation of the results.

None

5. What was the total unreclaimed acreage at years end? N/A

6. Briefly summarize mining and reclamation planned for the upcoming year.
Plan to mine 200 million gallons brine during the year. No reclamation is required.

NOTE: Section III., "Additional Information" applies only to large mining operations.

III. ADDITIONAL INFORMATION

1. An updated surface facilities map should be attached if there have been significant changes since the previous map was submitted.

2. Any monitoring results or other reports that are required under the terms of the approved notice of intention should also be attached.

IV. SIGNATURE REQUIREMENT

I hereby certify that the foregoing is true and correct.

Name (Typed or Print): Don H. Wilkinson

Title of Operator: President, Magnesium Corporation of America

Signature of Operator: D. H. Wilkinson

Date: January 21, 1991

jb
MNMR-AR

Cycle Time Estimating Chart

Model		307B	311B	312B, 312B L	315B, 315B L	317B L, 317B LN	318B L, 318B LN	320B	322B	325B	330B	345B*	360
Bucket Size													
L		280	450	520	520	520	800	800	1000	1100	1400		1900
(yd³)		0.37	0.59	0.68	0.68	0.68	1.05	1.05	1.31	1.44	1.83		2.5
Soil Type		← Packed Earth →						← Hard Clay →					
Digging Depth	(m)	1.5	1.5	1.8	3.0	3.0	3.0	2.3	3.2	3.2	3.4		4.2
	(ft)	5	5	6	10	10	10	8	10	10	11		14
Load Bucket	(min)	0.08	0.07	0.07	0.10	0.10	0.09	0.09	0.09	0.09	0.09		0.10
Swing Loaded	(min)	0.05	0.06	0.06	0.04	0.04	0.06	0.06	0.06	0.06	0.07		0.09
Dump Bucket	(min)	0.03	0.03	0.03	0.02	0.02	0.04	0.03	0.04	0.04	0.04		0.04
Swing Empty	(min)	0.06	0.05	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.07		0.07
Total Cycle Time	(min)	0.22	0.21	0.21	0.21	0.21	0.25	0.23	0.25	0.25	0.27		0.30

*Information not available at time of printing.

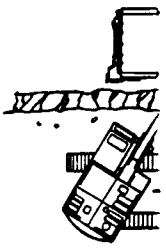
CYCLE TIME ESTIMATING CHART

CYCLE TIME	MACHINE SIZE CLASS											CYCLE TIME
	307	311B	312B	315B	318B L	320B	322B	325B	330B	345B*	350	375	
10 SEC.													0.17 min.
15													0.25 min.
20 SEC.													0.33 min.
25													0.42 min.
30 SEC.													0.50 min.
35													0.58 min.
40 SEC.													0.67 min.
45													0.75 min.
50 SEC.													0.83 min
55													0.92 min
60 SEC.													1.0 min.

*Information not available at time of printing.

Caterpillar 300 Seri... move material faster a... bucket, shortest stick ... longer stick and stand... tion jobs.

MAXIMIZING PROD...



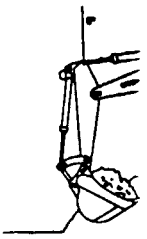


TABLE 2. Mining and Milling Cost Indexes

Source U.S. Department of Labor, Bureau of Labor Statistics

Note: All indexes are subject to revision four months after original publication.

Year/ Month	A Mine Labor	B Construction Labor	C Machinery & Equipment	D Iron & Steel	E Timber	F Petroleum Products	G Explosives	H Tires	I Industrial Commodities	J RR. Transp. Metallic Ores	K RR. Transp. Coal	L RR. Transp. Non-Metallic Minerals	M Electric Power	N Industrial Chemicals	O Coal	P Natural Gas
1965	2.92	3.70	27.2	28 9	28.9	12.3	33.3	36.4	30.9				21.2	27.7	17.5	
1966	3.05	3.89	28.1	29.1	30.4	12.8	32 8	37.3	31.5				21.1	27.9	17.9	
1967	3.19	4.11	29.1	29.5	31.1	13.1	33.5	36.8	32.0				21.1	28.4	18.7	
1968	3.35	4.41	30.7	30 1	37.5	12.9	34.2	37.8	32.8				21.3	28.6	19.4	7.6
1969	3.60	4.79	32.1	31.6	41.8	13.1	35.0	36.2	33.9	24.2	24.8	23.5	21.6	28.4	21.1	7.7
1970	3.85	5.24	33.7	34.0	35.2	13.3	35.7	38.8	35.2	26.4	26.9	25.4	22.5	28.6	28.1	7.9
1971	4.06	5.69	35.4	35.9	44.0	14.1	37.9	40.6	36.5	29.9	30.7	28.4	24.8	28.9	34.0	8.4
1972	4.44	6.06	36.6	37.9	52.1	14.3	38.5	41.0	37.8	31.0	31.9	29.5	26.2	28.7	36.2	r
1973	4.75	6.41	38.0	40.2	66.6	16.9	40.2	42.6	40.3	32.2	32.8	30.5	28.0	29.3	40.8	
1974	5.23	6.81	44.3	52.7	65.7	29.3	50.2	52.1	49.2	37.5	38.3	35.4	36.4	43.0	62.2	1[illegible]
1975	5.95	7.31	53.9	59.3	62.4	33.8	59.5	57.2	54.9	43.2	44.0	40.5	44.3	58.7	71.2	16.1
1976	6.46	7.71	57.8	63.7	77.1	36.3	62.6	63.6	58.4	47.9	49.4	45.0	47.9	62.2	68.9	21.8
1977	6.94	8.10	62 1	68.0	92.5	40.5	64 9	66.9	62.5	51.2	52.4	48.3	54.3	63.5	72.8	30.8
1978	7.67	8.66	67.7	74.8	107.6	42.2	69.8	70.7	67.1	55.1	56.5	52.0	59.1	64.0	80.4	36.5
1979	8.49	9.27	74.5	83.6	118.1	58.4	75.5	80.9	75.7	63.8	65.9	60.6	64.5	74.9	84.3	47.6
1980	9.17	9.94	84.2	90 0	107.3	88.6	84.0	92.1	88.0	74.5	75.8	72.2	77.8	91.9	87.4	63.3
1981	10 04	10.82	93 3	98.5	106 6	105.9	96.7	99.5	97.4	86.1	86.9	86.4	89.2	103.1	93.0	82.1
1982	10.77	11.63	100.0	100.0	100 0	100.0	100 0	100.0	100.0	93.9	95.4	93.3	100.0	100.0	100.0	100.0
1983	11.28	11.94	102 3	101 3	115.0	89 9	101.1	95.7	101.1	95.9	96.5	94.6	103.1	97.3	100.5	106.6
1984	11.63	12.13	103 8	105.3	110.0	87.4	103.6	93.4	103.3	99.4	99.9	98.9	108.4	96.8	102.2	106.1
1985	11.98	12 32	105.4	104 8	107 4	83.2	105.0	90.5	103.7	100.2	100.0	100.1	112.8	96.0	102.2	102.9
1986	12 46	12.48	106 7	101 1	108 4	53 2	103.6	88 0	100 0	100.5	100.7	101.6	114.5	91.5	100.8	89.6
1987	12.54	12.71	108 9	104.6	116 1	56 8	107 3	87.7	102.6	99.0	100.1	101.1	111.9	95.5	97.1	79.5
1988	12.80	13 08	111.8	115 7	112 4	53.9	109.0	92.5	106.3	103.9	104.3	106.1	112.6	106.8	95.4	77.4
1989	13.26	13.54	117 2	119.1	127 1	61 2	117.6	96.3	111.6	105.8	105.3	108.3	116.2	114.8	95.5	82.0
1990	13.68	13 77	121 6	117.2	123 8	74 8	125 6	93 8	115.8	106.5	104.2	111.7	119.6	113.2	97.5	80.4
1991	14.19	14.00	125 2	114 1	125 7	67 2	132 1	95.7	116.5	106.7	105.2	115.9	128.1	111.8	97.2	79.1
1992	14.54	14.15	128 7	111 5	148 6	64 7	132.0	96 3	117.4	106 6	105.9	117.6	129.6	109.3	95.0	80.6
1993	14.60	14.38	132 0	116 0	183 4	62 0	132 6	95.3	118 9	106 7	106.6	119.3	130.6	110.4	96.1	r
1994	14.88	14.73	133 7	122.0	198 1	59 1	139 5	93.8	120.7	104.6	107.5	119.7	129.2	114.3	96.7	
1995	15.30	15.08	136 7	128 8	178 5	60 8	144.2	93.0	125.5	101.9	107.3	119.5	130.8	128.4	95.0	86.6
1996	15.61	15.46	139 8	125.8	189.5	70 1	146.4	90.6	127.3	103.5	106.7	119.2	131.6	126.7	94.5	91.2
1997	16.17	16.03	142.2	126 5	206.5	68 0	149.1	89.0	127.7	103.4	107.0	120.6	130.8	126.4	96.3	101.7
1998	16.95	16.56	145.1	122.6	182.4	51 3	147 3	89.6	124.8	104.2	109.0	120.9	130.0	121.6	93.1	83.7
1998 - Jan.	16.65	16.25	144.8	127 0	190.9	57 4	149 2	89.3	125.9	105 1	110.6	121.2	127.4	125.8	91.7	90.9
1998 - Feb.	16.89	16.21	144 9	126.6	192 9	54 4	149 5	90.2	125.3	105.8	110.3	121.4	127.2	124.1	94.5	91.9
1998 - Mar.	16.89	16.29	145 0	125 7	193.7	50 6	148 6	90.2	125.0	105 8	109 0	121.4	126.7	123.1	93.5	86.4
1998 - Apr.	16.84	16.34	145 0	125 5	193.4	52 7	148 3	90.0	125 3	106.2	109.0	121.5	126.4	122.3	95.2	90.1
1998 - May	16.73	16.42	145 2	125 3	187.0	54 9	146 4	89.1	125.5	106 2	109.0	121.5	129.2	121.9	94.5	90.5
1998 - June	16.73	16.44	145 3	125 0	177.1	53 2	146 5	89.7	125.1	106 2	108.7	121.5	133.8	121.4	94.7	91.9
1998 - July	16.81	16.63	145.3	124.2	181.6	52 1	146.5	89.0	125.3	103 7	108.3	121.5	134.8	121.1	94.3	89.0
1998 - Aug	16.94	16.74	145 4	122 6	183.4	49 1	146 6	88 8	124.5	103 7	108.3	121.7	135.2	120.4	90.7	82.1
1998 - Sept	17.16	16.76	145.3	120.5	175 2	49 7	146 6	89.9	124.1	103.7	108 3	121.7	135.4	119.5	91.0	69.8
1998 - Oct.	17.13	16.86	145 2	117 6	171 9	51 0	146 9	89 8	124.2	102 5	108 4	121.7	130.4	119.2	92.8	77.6
1998 - Nov	17.34	16.79	145 3	115 6	170.3	48 8	146 8	89 8	123.8	102 1	107 4	121.7	127.6	119 4	94 2	83.1
1998 - Dec.	17.35	16.84	145.4	115.0	174.2	41 8	146.4	89 8	123.1	101 2	108 2	**	127.5	119.8	92.1	80.3
1999 - Jan.	17.28	16.72	146 2	114 6	181.3	44 6	145 8	89 4	123.4	100 8	107 3	121 7	127.4	118 9	94.7	74.7
1999 - Feb.	17.21	16.65	146 5	114.0	186 8	42 5	146 5	89 4	122 8	100 9	**	121 7	126.6	118 0	90 2	71.0
1999 - Mar.	17.32	16.77	146 7	112 8	193 7	45 7	147 1	89 0	123 3	105 0	107 1	121 8	126.5	117 4	92.4	69.8

** not available

010 000 | Overhead

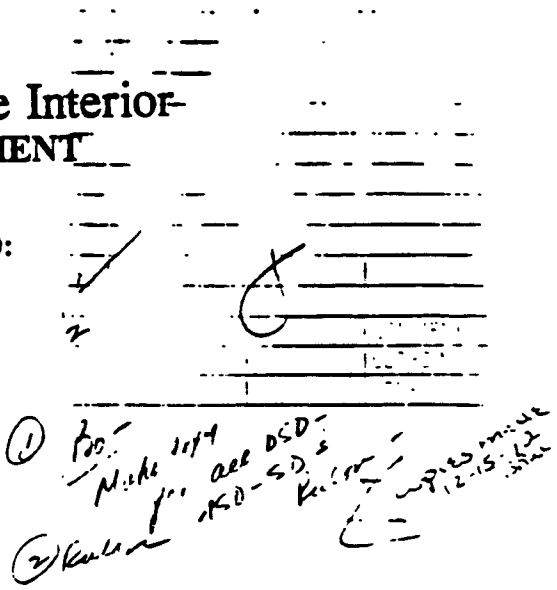
			CREW	DAILY OUTPUT	LABOR-HOURS	UNIT	1998 BARE COSTS MAT.	LABOR	EQUIP.	TOTAL	TOTAL INCL O&P
004	0011	**ARCHITECTURAL FEES** R010 -010									
	0020	For new construction				Project					
	0060	Minimum									4.90%
	0090	Maximum									16%
	0100	For alteration work, to $500,000, add to fee									50%
	0150	Over $500,000, add to fee									25%
012	0012	**CONSTRUCTION COST INDEX** (Appendix) for 67 major U.S. and									
	0021	Canadian cities, total cost, min. (Rock Springs, WY)				%					79.40%
	0050	Average									100%
	0101	Maximum (Anchorage, AK)									125.20%
014	0010	**CONSTRUCTION ECONOMIES** For bricklaying R042 -100									
016	0010	**CONSTRUCTION MANAGEMENT FEES** $1,000,000 job, minimum				Project					4.50%
	0050	Maximum									7.50%
	0300	$5,000,000 job, minimum									2.50%
	0350	Maximum									4%
018	0010	**CONSTRUCTION TIME** Requirements R010 -020									
020	0010	**CONTINGENCIES** Allowance to add at conceptual stage				Project					15%
	0050	Schematic stage									10%
	0100	Preliminary working drawing stage									7%
	0150	Final working drawing stage									2%
022	0010	**CONTRACTOR EQUIPMENT** See division 016 R016 -410									
024	0010	**CREWS** For building construction, see How To Use This Book									
028	0010	**ENGINEERING FEES** R010 -030									
	0020	Educational planning consultant, minimum				Project					.50%
	0100	Maximum				"					2.50%
	0200	Electrical, minimum				Contrct					4.10%
	0300	Maximum									10.10%
	0400	Elevator & conveying systems, minimum									2.50%
	0500	Maximum									5%
	0600	Food service & kitchen equipment, minimum									8%
	0700	Maximum									12%
	0800	Landscaping & site development, minimum									2.50%
	0900	Maximum									6%
	1000	Mechanical (plumbing & HVAC), minimum									4.10%
	1100	Maximum									10.10%
	1200	Structural, minimum				Project					1%
	1300	Maximum				"					2.50%
034	0010	**FIELD OFFICE EXPENSE**									
	0100	Field office expense, office equipment rental average				Month	130			130	143
	0120	Office supplies, average				"	84			84	92.50
	0125	Office trailer rental, see division 015-904									
	0140	Telephone bill; avg. bill/month incl. long dist.				Month	230			230	253
	0160	Field office lights & HVAC				"	86			86	94.50
036	0010	**FIELD PERSONNEL** Clerk average				Week		255		255	405
	0100	Field engineer, minimum						610		610	965
	0120	Average						795		795	1,255
	0140	Maximum						910		910	1,405
	0160	General purpose laborer, average						840		840	1,325
	0180	Project manager, minimum						1,150		1,150	1,815
	0200	Average						1,285		1,285	2,030
	0220	Maximum						1,450		1,450	2,290

036	0240	
	0260	
	0280	
	0290	
038	0010	HIST
040	0010	INSU
	0050	
	0200	
	0250	
	0400	
	0450	
	0600	
	0800	
	0850	
	0900	
	0950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
	1350	
	1400	
	1450	
	1500	
	1550	
	1600	
	1650	
	1700	
	1800	
	2010	
	2100	
	2200	
042	0010	JO
	0020	
	0100	
	0200	
	0300	
	0400	
	0500	
	0600	
	0700	
	0800	
	0900	
	1000	
	1100	
	1200	
	1300	
	1400	
046	0012	IN
	0021	
	0050	
	0101	

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240

IN REPLY REFER TO:
1681/1323 (880)

December 10, 1992



EMS Transmission 12/14/92
Instruction Memorandum No. 93-84
Expires 9/30/94

To: All WO and Field Officials

From: Director

Subject: Recovery of Indirect Administrative Costs

This instruction memorandum explains Bureau of Land Management (BLM) policy for the recovery of indirect costs associated with work done for non-BLM entities through reimbursements, service charges, road maintenance fee, and contributed funds accounts.

Application of the Indirect Administrative Cost Rate

The BLM is obligated by law and Governmentwide policy to collect indirect administrative costs when performing work for other entities, whether Federal, Non-Federal, or private. The indirect administrative cost rate generally applicable to all work is 18 percent of the total project cost, unless specifically exempted or reduced by other sections of this directive. All reimbursable projects in the Construction and Access (29XX), Management of Lands and Resources (49XX), and Oregon & California Grant Lands (69XX) appropriations, Service Charges (5XXX), and non-exempted Contributed Fund (71XX) projects are subject to the 18 percent indirect administrative cost rate. The indirect administrative rate for Road Maintenance Fee work in subactivities 9110 and 9120 remains at 5 percent of collections.

Also, reimbursable projects conducted for other Federal agencies with which the BLM has a National-level Memorandum of Understanding (MOU) which dictates a different administrative rate, such as the National MOU with the Forest Service which establishes a mutual indirect cost rate of 20 percent, and those projects covered by other MOUs with mutually adopted variable rates, are charged indirect administrative costs at the rate established by the appropriate MOU.

The indirect cost amounts collected by BLM will continue to be applied to a Bureauwide credit account and allocated on a Bureauwide basis as part of the 4830 (General Administration) cost targets to provide for the cost of supporting reimbursable, cost recoverable, and contributed fund projects.

Exceptions to the Indirect Administrative Cost Rate for Contributed Fund projects

Projects in the Contributions Account (71XX) that the cognizant BLM State Director determines are of primary benefit to the general public and further Bureau management objectives may be exempted from application of any indirect administrative cost charges or may be given reduced indirect administrative cost rates. The State Director is responsible for making the determination of exemption and calculating the new rate. If two or more States are involved in the contributed funds project, the cognizant State Directors are responsible for assuring that similar rates are applied. For 71XX projects determined to be exempt or having a reduced rate, the cognizant State Director is responsible for submitting the waiver form (BLM Form 1681-3a) to the BLM Service Center Division of Finance.

The BLM California State Director is authorized to set the indirect administrative rate for the California Off-Highway Vehicle (OHV) contribution (7123) projects. The rates should reflect the actual support required for each project.

Indirect Costs Associated with Fire Protection Reimbursements

Fire protection and presuppression reimbursable work performed under subactivity 1590 (Fire Reimbursements) for National Agreement Cooperating agencies and presuppression work for State agencies covered by formal agreements are exempt from the indirect administrative cost rate. This category of exempt activities includes: dispatch and logistical support services; prevention and detection services; crews and personnel, telecommunication support services; smokejumper operations, fire suppression training and support and training materials necessary for fire preparedness. Participating agencies which provide similar and like services in presuppression activities are the following: USDA-Forest Service, NPS, BIA, and FWS, and State Forestry agencies engaged in wildfire suppression. The indirect administrative charge also does not apply to 1590 interagency core funding for BIFC under Interagency Agreement No. 18.

Functions such as management type work, fire planning, indirect office space charges and prescribed fire activities are *not* exempt from the indirect administrative charges. All project costs (i.e., personnel time, leave surcharge, travel, materials, equipment, facilities, and utility charges) for subactivity 1590 fire presuppression work, will continue to be recovered via the reimbursable process, and recorded on BLM Form 1681-3, Reimbursable Work Project Authorization, a copy of which should be sent to the BLM Service Center Division of Finance (SC-615).

Review of the applicability of the full rate to certain reimbursable work

The application of the full indirect administrative cost rate to certain types of reimbursable projects, such as tying other Federal agencies into existing third-party contracts, has been identified in some cases as not equitable. The concern is that a large contract or a pass-thru project does not necessarily cost the BLM as much in administrative support as projects with

3

a large proportion of direct labor intensive work, yet the same rate is charged. Based on requests from the cognizant State Director, the Headquarters Office will consider applying lower rates, such as 10 percent, for such projects. Such requests are to be sent to the Headquarters Office Division of Budget (WO-880) for review and approval.

Waivers and Exceptions for other special projects

There may be some rare instances where a reduction or waiver of the indirect administrative cost rate for a certain Reimbursable (49XX, 29XX, 69XX) project may facilitate the BLM's work. If the cognizant State Director believes that there is a project warranting such an exception, a waiver/reduction of the indirect administrative cost rate can be requested from the Headquarters Office Division of Budget (WO-880) by the State Director in writing. Requests will be reviewed and, if justified, approved for a waiver. However, the BLM incurs administrative costs with all projects. These indirect support costs must be funded either through the application of the indirect rate or by a subsidy from appropriated General Administration (4830) or other program dollars.

In no case will waivers or reductions in the indirect administrative cost rate for cost recoverable projects under the Service Charges, Deposits and Forfeitures account (5XXX) for otherwise non-exempt programs be considered. Since these projects are being accomplished for the benefit of non-governmental agencies or private entities, the BLM must recover the full indirect administrative cost rate under the law.

Any questions regarding this instruction memorandum may be referred to Harold Grayson, Division of Budget (WO-880), on (202) 208-4168.

Signed
Roger Hildebeidel
Acting Assistant Director, Management Services

Authenticated
Georgette A. Fogle
Directives (WO 855)

T1N R13W Section 1, 0 1 miles (528 ft)

Drawing #1 Entering Dunes

Volume approx 2000 yds

Area 101 73 ft2 (Blue) CUT

Area 51.7 (Red) FILL

Area 4 70 ft2

Area 47 0 ft2

2.00 ft

Total Area 179.23 ft2 (Blue)

45.196 ft Push Distance

000393

T1N R12W Section 5, 0 2 miles (1056 ft)

Drawing #2Between Dunes

Volume 2866 yds

Area 72 90 ft2 (Blue) CUT

Area 34.81 ft2 Area 4.09 ft2 Area 36 45 ft2 (Red) FILL 2 0 ft

Area 185 08 ft2 Total

45 46 ft Push Distance

000394

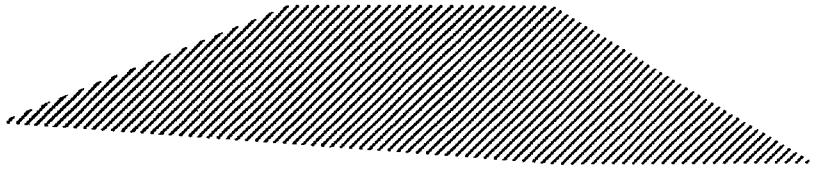
T. 1 N., R. 12 W. Section 20 & 21, (5000 Feet distance)

Drawing #3 Pond 5 North Dike

Volume approx. 88,150 yds

Area 660 62 ft2 (Blue) Cut

Pond 5



Estimated from Pond 5 SW Dike + 5 feet Elevation

312 Feet PUSH Distance

Average 475.55 ft2

Pond 5 SW Dike

Area 290 5 ft2 (Blue) Cut

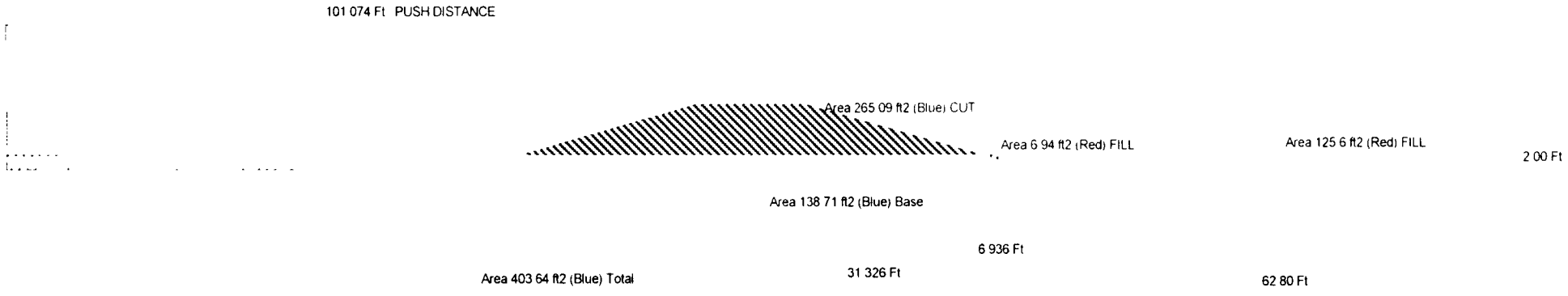
145 Feet PUSH Distance

000395

T1N R12W Section 6, 6400 ft.

Drawing #4 East end of Dune Field

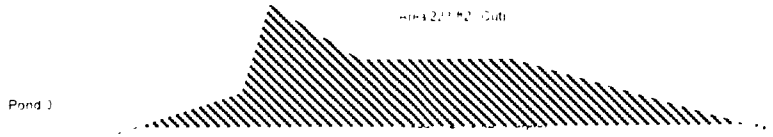
Volume Approx. 62,815 yds.



T1N R13W Section 2, 3, 4, 5 (21,000 Feet)

Drawing #5 North Dike Pond 0

Volume 172,700 yd3



Area 406.15 ft2 (Avg)

000397

T1N R13W Section 18 (40 000 Feet distance)

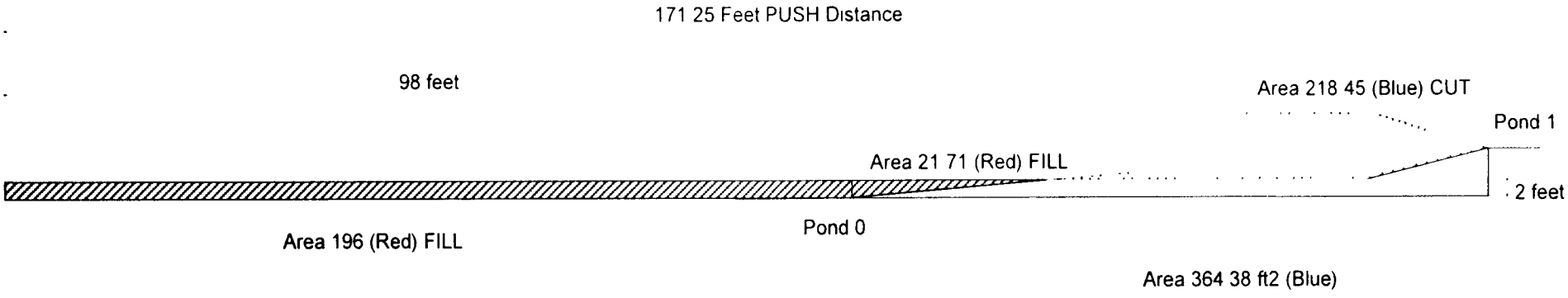
Drawing #b West Lake

Volume approx 356 600 yds

T. 1 S., R. 13 W. Section 7, (2500 Feet distance)

Drawing #7 Pond 0 - Pond1 Seperation

Volume approx. 21,000 yds



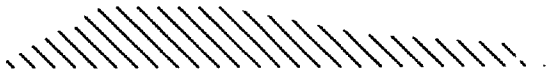
T 1 S , R 13 W Section 7 & 18, (7500 Feet distance)

Drawing #8 Pond1 West Dike

Volume approx 90,833 yds

Area 327 06 ft2 (Blue) CUT

Area 163 53 ft2 (Red) FILL



Area 11 0 ft2 (Red) FILL

Area 152 5 ft2 (Red) FILL

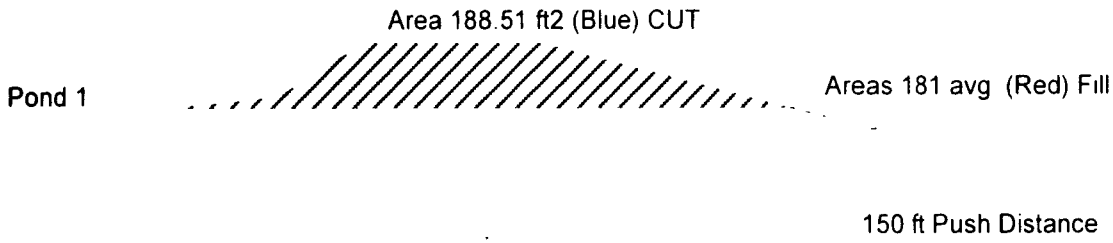
121 52 Feet Push Distance

000400

T. 1 S., R. 13 W. Section 15 & 17, (13,700 F eet distance)

Drawing #9 Pond1 South Dike

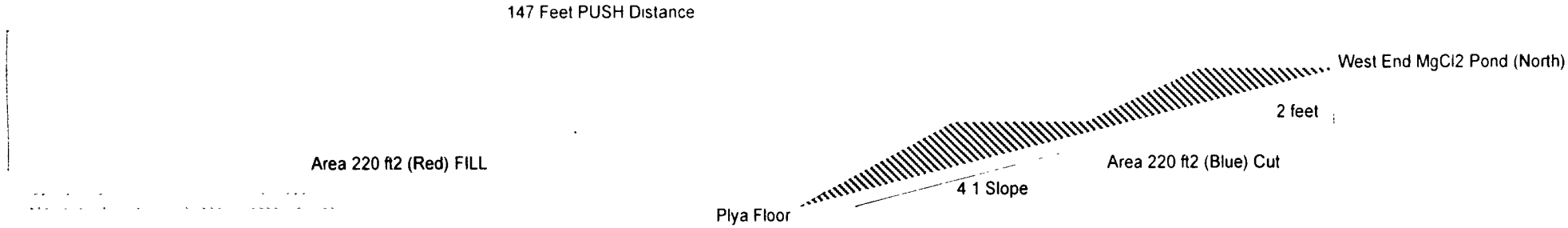
Volume approx. 95,900 yds



T. 1 S., R. 13 W. Section 15, (4900 Feet distance)

Drawing #10 North Brine Storage Pond

Volume approx. 40,000 yds



T. 1 S., R. 13 W. Section 13 & 14, (7500 Feet distance)

Drawing #11 South Dike Pond 7 System

Volume approx. 258,000 yds

Area 929 2 ft2 (Blue) Cut

7 System Ponds

466 Feet PUSH Distance

T1S R12W Secs 6,5,4 (7,500 Feet)

Drawing #13 7D North Dike

Volume 50,000 yds

Area 180 ft2 (Avg)

Pond 7D

Area 175 ft2 (Avg)

Plya Floor

Push Distance Approx 138 feet

T1S R12W Secs 6,5,4 (4,000 Feet)

Drawing #13 7D North Dike

Volume 11,000 yds

Area 73 ft2 (Avg)

Pond 5

Pond 7D

Push Distance Approx. 138 feet

Note Reference Drawing 14 for Notes.

000405

T1S R12W Secs. 5 (85,000 Feet)

Drawing # 15 & 17 Interior 7 System Dikes

Volume 158,000 yds

Average Area 50 ft2

Area 81.7 ft2 (Avg)

Pond 7a

Pond 7b

Area 22.75 ft2 (Avg)

Pond 7c

Pond 7c

Caterpillar Performance Handbook

CATERPILLAR®

000409

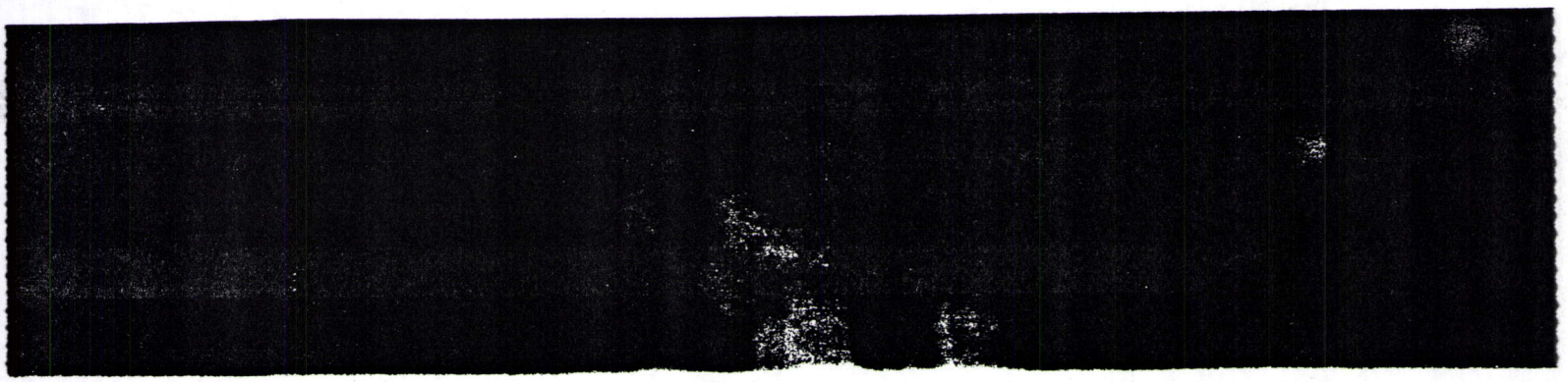
D7R XR
171 kW 230 hp
25 193 kg 55,600 lb
—
25 492 kg 56,200 lb
3306TA
2100
6
121 mm 4.75"
152 mm 6"
10.5 L 638 in³
8
610 mm 2'0"
3.05 m 10'0"
3.72 m² 5760 in²
1.98 m 6'6"
2.56 m 8'5"
3.35 m 10'11"
3.43 m 11'2"
—
5.81 mm 19'1"
4.67 m 15'4"
2.87 m 9'5"
2.59 m 8'6"
416 mm 16.4"
3.32 m 11'7"
4.50 m 14'9"
—
—
3.98 m 13'1"
3.69 m 12'2"
479 L 127 U.S. gal

lt, horn, back-up alarm, retrieval

MODEL	D7R LGP	D8R	D8R LGP	D9R
Flywheel Power	179 kW 240 hp	228 kW 305 hp	228 kW 305 hp	302 kW 405 hp
Operating Weight:*				
Power Shift	27 065 kg 59,700 lb	—	—	48 440 kg 106,790 lb
Power Shift Differential Steer	27 364 kg 60,300 lb	37 580 kg 82,850 lb	33 730 kg 74,360 lb	48 840 kg 107,670 lb
Engine Model	3306TA	3406CTA	3406CTA	3408ETA
Rated Engine RPM	2100	2100	2100	1900
No. of Cylinders	6	6	6	8
Bore	121 mm 4.75"	137 mm 5.4"	137 mm 5.4"	137 mm 5.4"
Stroke	152 mm 6"	165 mm 6.5"	165 mm 6.5"	152 mm 6"
Displacement	10.5 L 638 in³	14.6 L 893 in³	14.6 L 893 in³	18 L 1099 in³
Track Rollers (Each Side)	7	8	8	8
ERF†	9	—	—	—
Width of Standard Track Shoe	914 mm 3'0"	560 mm 1'10"	965 mm 3'2"	610 mm 2'0"
Length of Track on Ground	3.16 m 10'5"	3.21 m 10'6"	3.20 m 10'6"	3.47 m 11'5"
Ground Contact Area (W/Std. Shoe)	5.78 m² 8960 in²	3.57 m² 5544 in²	6.2 m² 9576 in²	4.24 m² 6569 in²
Track Gauge	2.24 m 7'4"	2.08 m 6'10"	2.34 m 7'8"	2.25 m 7'5"
GENERAL DIMENSIONS:				
Height (Stripped Top)**	2.74 m 9'0"	2.67 m 8'9"	2.67 m 8'9"	3.00 m 9'10"
Height (To Top of ROPS)	3.43 m 11'3"	3.51 m 11'6"	3.51 m 11'6"	3.99 m 13'1"
Height (To Top of ROPS Canopy)	3.52 m 11'6"	3.51 m 11'6"	3.51 m 11'6"	3.99 m 13'1"
Height (To Top of Cab ROPS)	3.58 m 11'9"	3.45 m 11'3"	3.45 m 11'3"	—
Overall Length (With SU Blade)***	—	6.39 m 21'0"	6.39 m 21'0"	6.84 m 22'5"
(Without Blade)	—	4.93 m 16'2"	4.93 m 16'2"	5.18 m 17'0"
Overall Length (With S Blade)	5.78 m 19'0"	—	—	—
(Without Blade)	4.67 m 15'4"	—	—	—
Width (Over Trunnions)	3.37 m 11'1"	3.05 m 10'0"	3.55 m 11'7"	3.30 m 10'10"
Width (W/O Trunnions — Std. Shoe)	3.15 m 10'4"	2.7 m 8'8"	—	2.93 m 9'8"
Width (With Standard Shoe)	—	—	3.37 m 10'10"	—
Ground Clearance	496 mm 1'7.5"	606 mm 1'11"	574 mm 1'10.6"	591 mm 1'11"■
Blade Types and Widths:				
Straight	4.50 m 14'9"	—	—	—
Angle Straight	—	4.99 m 16'4"	—	—
Universal	—	4.26 m 14'0"	3.94 m 12'11"	4.65 m 15'3"
Semi-U	—	3.94 m 12'11"	4.52 m 14'10"	4.32 m 14'2"
Fuel Tank Refill Capacity	479 L 127 U.S. gal	625 L 165 U.S. gal	625 L 165 U.S. gal	818 L 216 U.S. gal

* Operating Weight includes ROPS canopy, operator, lubricants, coolant, full fuel tank, hydraulic controls and fluids, semi universal blade with tilt, back-up alarm, seat belts, lights, rigid drawbar and front towing device.
— D8R and D9R equipped with track guides, ROPS/FOPS cab, single shank ripper and SU blade.
** Height (stripped top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.
*** Includes drawbar.
■ SAE J1234.
† ERF — Extended Track Roller Frame. Extends frame 366 mm (14.4"), adds 3 track sections and 2 rollers/side.

000410



MODEL	D6R, D6R XL & D6R LGP					
	6S LGP		6A (IG)		6SU (IG)	
Type	Straight		Angling		Semi Universal	
Blade Capacities*	3.70 m³	4.83 yd³	4.3 m³	5.63 yd³	5.62 m³	7.4 yd³
Weight, Shipping** (Dozer)	2801 kg	6162 lb	3260 kg	7180 lb	2950 kg	6500 lb
Tractor & Dozer Dimensions:						
A Length (Blade Straight)	5.71 m	18'9"	—		—	
Blade Dimensions:						
B Width (including std. end bits)	3.99 m	13'1"	4.20 m	13'9"	3.56 m	11'8"
C Height	1101 mm	3'7.3"	1169 mm	3'10"	1412 mm	4'8"
D Max. Digging Depth	655 mm	2'1.2"	500 mm	1'7.7"	459 mm	18.1"
E Ground Clearance @ Full Lift	1083 mm	3'6.6"	1242 mm	4'1"	1195 mm	3'11"
F Manual Tilt	632 mm	2'0.9"	408 mm	16.1"	670 mm	2'2.4"
G Max. Pitch	+5.3°–4.8°		+5.3°–4.8°		+5.3°–4.8°	
H Max. Hydraulic Tilt	701 mm	2'3.6"	408 mm	16.1"	743 mm	2'5.3"
J Hydraulic Tilt (Manual Brace Centered)	385 mm	15.2"	408 mm	16.1"	743 mm	2'5.3"

* Blade capacities as determined by SAE J1265.
Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.
** Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

MODEL	D7R & D7R LGP									
	7A		7S		7SU		7U		7S LGP ERF†	
Type	Angling		Straight		Semi Universal		Universal		Straight	
Blade Capacities*	3.89 m³	5.08 yd³	5.16 m³	6.75 yd³	6.86 m³	8.98 yd³	8.34 m³	10.91 yd³	5.89 m³	7.7 yd³
Weight, Shipping** (Dozer)	3527 kg	7750 lb	3500 kg	7716 lb	3593 kg	7904 lb	3920 kg	8624 lb	3732 kg	8210 lb
General Dimensions (Tractor & Dozer)										
A Length (Blade Straight)	6.10 m	20'0"	5.81 m	19'1"	6.03 m	19'9"	6.27 m	20'7"	5.81 m	19'1"
Length (Blade Angled)	6.98 m	22'11"	—		—		—		—	
Width (Blade Angled)	4.12 m	13'6"	—		—		—		—	
Width (with C-Frame only)	3.09 m	10'1"	—		—		—		—	
Blade Dimensions:										
B Width (including std. end bits)	4.50 m	14'9"	3.90 m	12'10"	3.69 m	12'1"	3.98 m	13'1"	4.50 m	14'9"
C Height	1111 mm	3'7.7"	1363 mm	4'5.7"	1524 mm	5'0"	1553 mm	5'1.1"	1343 mm	4'4.9"
D Max. Digging Depth	669 mm	2'2.3"	527 mm	1'8.7"	527 mm	1'8.7"	527 mm	1'8.7"	668 mm	2'2.3"
E Ground Clearance @ Full Lift	1115 mm	3'7.9"	1145 mm	3'9.1"	1145 mm	3'9.1"	1145 mm	3'9.1"	1153 mm	3'9.4"
F Manual Tilt	466 mm	18.3"	—		—		—		—	
G Max. Pitch Adjustment	—		+3.1°–3.9°		+3.1°–3.9°		+3.1°–3.9°		+3.0°–3.9°	
Blade Angle (either side)	25°		—		—		—		—	
H Max. Hydraulic Tilt	627 mm	2'0.7"◀	845 mm	2'9.3"	799 mm	2'7.4"	861 mm	2'9.9"	686 mm	2'3"
J Hydraulic Tilt (Manual Brace Centered)	—		501 mm	1'7.7"	474 mm	18.6"	511 mm	1'8.1"	426 mm	16.8"

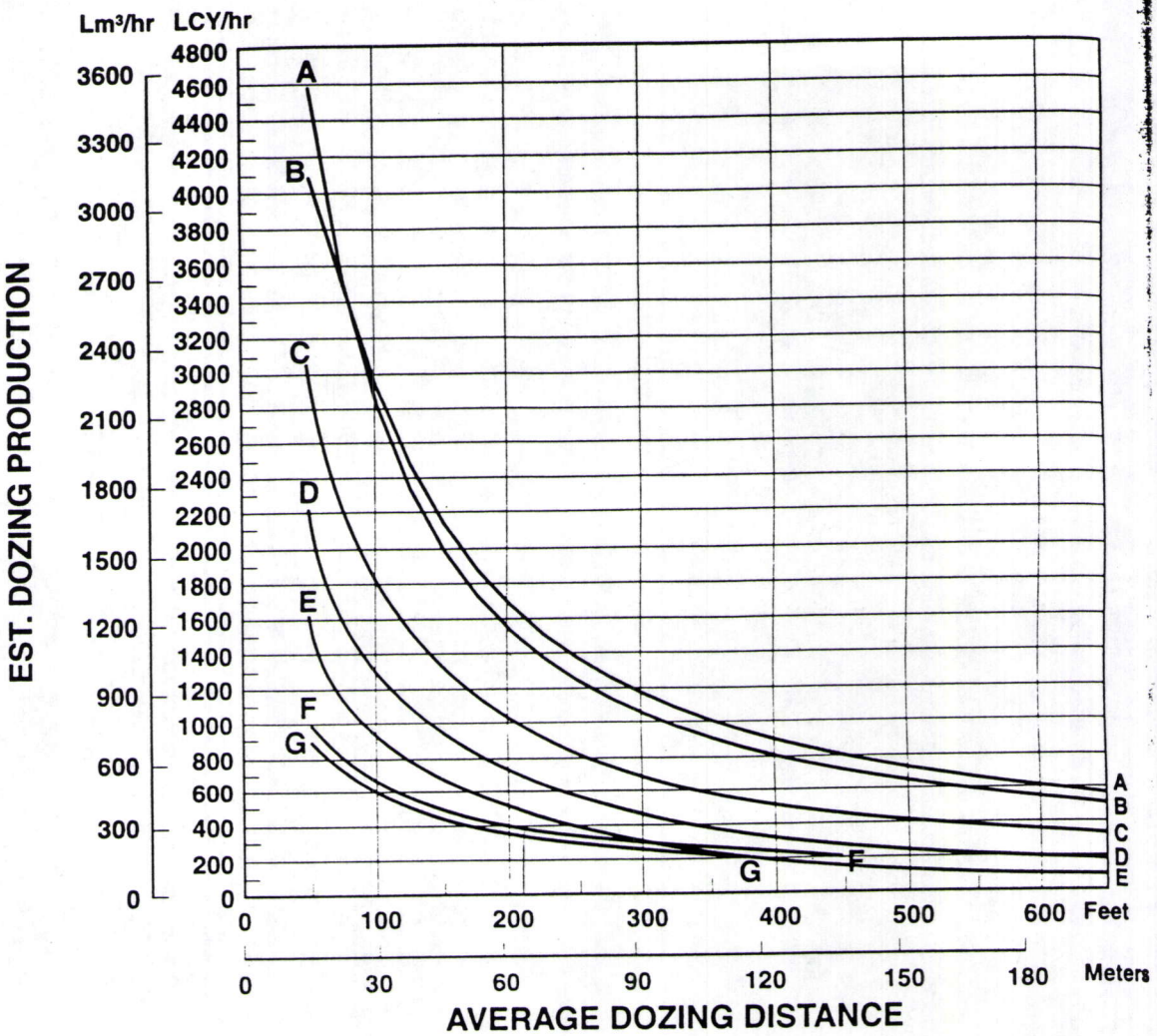
* Blade capacities as determined by SAE J1265.
Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.
** Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.
† Extended track roller frame.
◀ Attachment includes two cylinders.

MODEL
Type
Blade Capacities*
Weight, Shipping** (Dozer)
General Dimensions (Tractor & Dozer)
A Length (Blade Straight)
Length (Blade Angled)
Width (Blade Angled)
Width (with C-Frame only)
Blade Dimensions:
B Width (including std. end bits)
C Height
D Max. Digging Depth
E Ground Clearance @ Full Lift
G Max. Pitch Adjustment
Blade Angle (either side)
H Max. Hydraulic Tilt
J Hydraulic Tilt (Manual Brace Center
K Pusharm Trunnion Width (to Ball Centers)
Maximum Track Width Permitted
Dual Tilt Option
G Dual Pitch Adj.
H Dual Max. Hyd. Tilt

* Blade capacities as determined t
Notice that the capacity of the U
intended for **relative comparis**
** Shipping Weight — Total Bulldoz
◀ Attachment includes two cylinde

000411

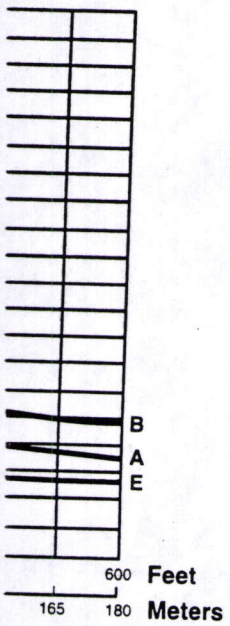
ESTIMATED DOZING PRODUCTION ● Universal Blades ● D7G through D11R



KEY

A — D11R-11U
B — D11R CD
C — D10R-10U
D — D9R-9U
E — D8R-8U
F — D7R-7U
G — D7G-7U

NOTE: This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.



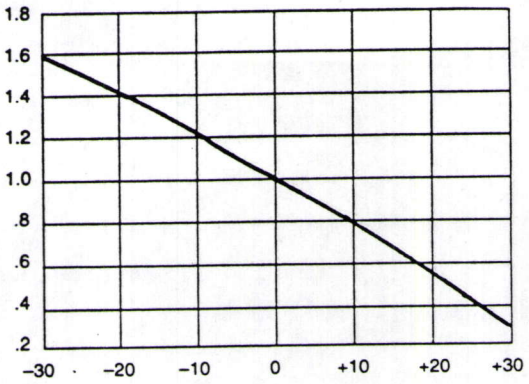
the next page.

JOB CONDITION CORRECTION FACTORS

	TRACK-TYPE TRACTOR	WHEEL-TYPE TRACTOR
OPERATOR —		
Excellent	1.00	1.00
Average	0.75	0.60
Poor	0.60	0.50
MATERIAL —		
Loose stockpile	1.20	1.20
Hard to cut; frozen —		
with tilt cylinder	0.80	0.75
without tilt cylinder	0.70	—
cable controlled blade	0.60	—
Hard to drift; "dead" (dry, non-cohesive material) or very sticky material	0.80	0.80
Rock, ripped or blasted	0.60-0.80	—
SLOT DOZING	1.20	1.20
SIDE BY SIDE DOZING	1.15-1.25	1.15-1.25
VISIBILITY —		
Dust, rain, snow, fog or darkness	0.80	0.70
JOB EFFICIENCY —		
50 min/hr	0.83	0.83
40 min/hr	0.67	0.67
BULLDOZER*		
Adjust based on SAE capacity relative to the base blade used in the Estimated Dozing Production graphs.		
GRADES — See following graph.		

*NOTE: Angling blades and cushion blades are not considered production dozing tools. Depending on job conditions, the A-blade and C-blade will average 50-75% of straight blade production.

% Grade vs. Dozing Factor
(–) Downhill
(+) Uphill



ESTIMATING DOZER PRODUCTION OFF-THE-JOB

Example problem:

Determine average hourly production of a D8R/8SU (with tilt cylinder) moving hard-packed clay an average distance of 45 m (150 feet) down a 15% grade, using a slot dozing technique.

Estimated material weight is 1600 kg/Lm³ (2650 lb/LCY). Operator is average. Job efficiency is estimated at 50 min/hr.

Uncorrected Maximum Production — 458 Lm³/h (600 LCY/hr) (example only)

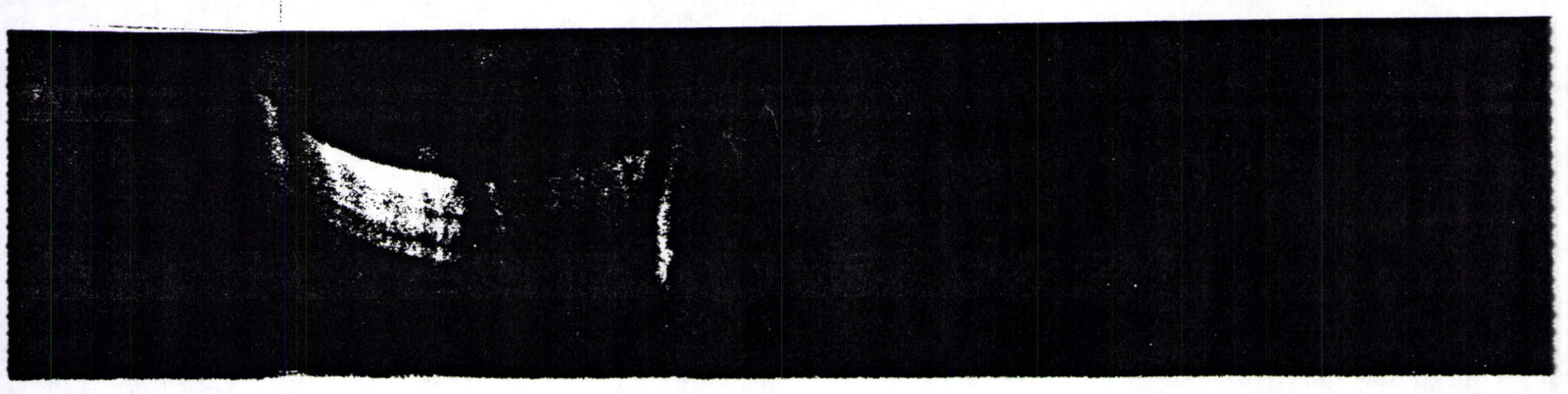
Applicable Correction Factors:

Hard-packed clay is "hard to cut" material –0.80
Grade correction (from graph) . . . . . –1.30
Slot dozing . . . . . –1.20
Average operator . . . . . –0.75
Job efficiency (50 min/hr) . . . . . –0.83
Weight correction . . . . . (2300/2650)–0.87

Production = Maximum Production × Correction Factors
= (600 LCY/hr) (0.80) (1.30) (1.20) (0.75) (0.83) (0.87)
= 405.5 LCY/hr

To obtain production in metric units, the same procedure is used substituting maximum uncorrected production in Lm³.

= 458 Lm³/h × Factors
= 309.6 Lm³/h



LGP CRAWLER DOZERS (cont.)

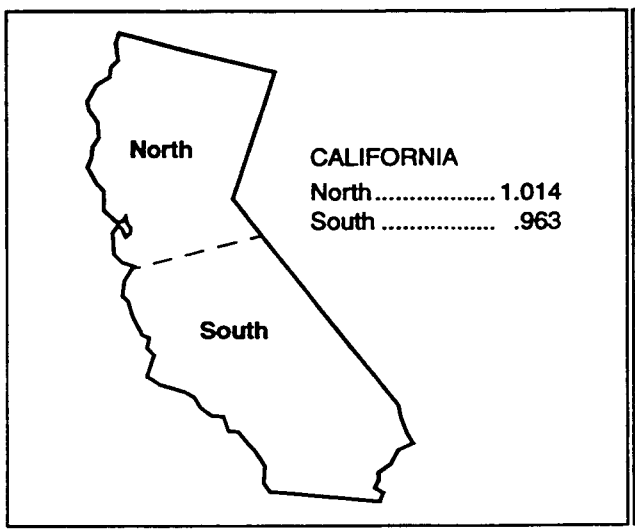
Model (Yr.Disc.)	Dozer Type	Operator Protection	HP	Monthly $	Weekly $	Daily $	Hourly $	Estimated Operating Cost $/Hr.
DIESEL POWERED (CONT.)								
CATERPILLAR (cont.)								
D5C III LGP HYSTAT	VPAT	ROPS	90.0	4,330.00	1,210.00	305.00	46.00	13.75
D5C SERIES III LGP	Power Angle Tilt	EROPS	91.0	4,480.00	1,255.00	315.00	47.00	14.05
D5C SERIES III LGP	Power Angle Tilt	ROPS	91.0	4,165.00	1,165.00	290.00	44.00	13.65
D5H LGP SERIES II (1996)	Power Angle Tilt	EROPS	130.0	6,485.00	1,815.00	455.00	68.00	19.40
D5H LGP SERIES II (1996)	Power Angle Tilt	ROPS	130.0	6,195.00	1,735.00	435.00	65.00	19.00
D5M LGP	Power Angle Tilt	EROPS	110.0	5,315.00	1,490.00	375.00	56.00	16.20
D5M LGP	Power Angle Tilt	ROPS	110.0	5,135.00	1,440.00	360.00	54.00	15.95
D6H DS LGP SERIES II (1997)	Straight	EROPS	165.0	7,815.00	2,190.00	550.00	83.00	23.45
D6H DS LGP SERIES II (1997)	Straight	ROPS	165.0	7,500.00	2,100.00	525.00	79.00	23.00
D6H LGP SERIES II (1997)	Straight	EROPS	165.0	7,550.00	2,115.00	530.00	80.00	23.05
D6H LGP SERIES II (1997)	Straight	ROPS	165.0	7,235.00	2,025.00	505.00	76.00	22.55
D6M LGP	Power Angle Tilt	EROPS	140.0	6,745.00	1,890.00	475.00	71.00	20.00
D6M LGP	Power Angle Tilt	ROPS	140.0	6,485.00	1,815.00	455.00	68.00	19.65
D6R DS LGP	Straight	EROPS	185.0	8,300.00	2,325.00	580.00	87.00	24.80
D6R DS LGP	Straight	ROPS	185.0	7,990.00	2,235.00	560.00	84.00	24.35
D6R LGP	Straight	EROPS	185.0	8,245.00	2,310.00	580.00	87.00	24.75
D6R LGP	Straight	ROPS	185.0	7,935.00	2,220.00	555.00	83.00	24.30
D7H DS LGP SERIES II (1996)	Straight	EROPS	215.0	11,830.00	3,310.00	830.00	125.00	32.00
D7H DS LGP SERIES II (1996)	Straight	ROPS	215.0	11,420.00	3,200.00	800.00	120.00	31.40
D7H LGP SERIES II (1996)	Straight	EROPS	215.0	11,380.00	3,185.00	795.00	120.00	31.50
D7H LGP SERIES II (1996)	Straight	ROPS	215.0	10,970.00	3,070.00	770.00	115.00	30.90
D7R DS LGP	Straight	EROPS	240.0	13,105.00	3,670.00	920.00	140.00	33.85
D7R DS LGP	Straight	ROPS	240.0	12,720.00	3,560.00	890.00	135.00	33.30
D7R LGP	Straight	EROPS	240.0	12,790.00	3,580.00	895.00	135.00	33.50
D7R LGP	Straight	ROPS	240.0	12,410.00	3,475.00	870.00	130.00	32.95
DEERE								
450H LGP	Power Angle Tilt	EROPS	74.0	3,780.00	1,060.00	265.00	40.00	12.05
450H LGP	Power Angle Tilt	ROPS	74.0	3,505.00	980.00	245.00	37.00	11.75
550H LGP	Power Angle Tilt	EROPS	84.0	4,290.00	1,200.00	300.00	45.00	13.30
550H LGP	Power Angle Tilt	ROPS	84.0	4,015.00	1,125.00	280.00	42.00	13.00
650H LGP	Power Angle Tilt	EROPS	90.0	4,610.00	1,290.00	325.00	49.00	14.10
650H LGP	Power Angle Tilt	ROPS	90.0	4,335.00	1,215.00	305.00	46.00	13.80
750B LGP (1995)	Straight	EROPS	140.0	5,415.00	1,515.00	380.00	57.00	19.15
750B LGP (1995)	Straight	ROPS	140.0	5,170.00	1,450.00	365.00	55.00	18.80
750C LGP	Straight	EROPS	140.0	6,535.00	1,830.00	460.00	69.00	19.85
750C LGP	Straight	ROPS	140.0	6,245.00	1,750.00	440.00	66.00	19.45
850B LGP (1995)	Straight	EROPS	165.0	6,815.00	1,910.00	480.00	72.00	22.70
850B LGP (1995)	Straight	ROPS	165.0	6,460.00	1,810.00	455.00	68.00	22.15
850C LGP	Straight	EROPS	185.0	8,230.00	2,305.00	575.00	86.00	24.90
850C LGP	Straight	ROPS	185.0	7,905.00	2,215.00	555.00	83.00	24.40
DRESSER								
TD12C LGP	Straight	EROPS	125.0	6,485.00	1,815.00	455.00	68.00	18.75
TD12C LGP	Straight	ROPS	125.0	6,125.00	1,715.00	430.00	65.00	18.30
TD15E LGP	Straight	EROPS	175.0	8,805.00	2,465.00	615.00	92.00	25.05
TD15E LGP	Straight	ROPS	175.0	8,465.00	2,370.00	595.00	89.00	24.55
TD20G LGP (1998)	Straight	EROPS	225.0	12,675.00	3,550.00	890.00	135.00	33.45
TD20G LGP (1998)	Straight	ROPS	225.0	12,320.00	3,450.00	865.00	130.00	32.90
TD20H LGP	Straight	EROPS	225.0	13,210.00	3,700.00	925.00	140.00	33.35
TD20H LGP	Straight	ROPS	225.0	12,555.00	3,515.00	880.00	130.00	32.55
FURUKAWA								
FD45P-1	Hyd	ROPS	39.0	2,490.00	695.00	175.00	26.00	8.30
KOMATSU								
D21P-7	Power Angle Tilt	EROPS	40.0	3,575.00	1,000.00	250.00	38.00	9.60
D21P-7	Power Angle Tilt	ROPS	40.0	3,165.00	885.00	220.00	33.00	9.05
D31P-20A	Power Angle Tilt	EROPS	70.0	4,270.00	1,195.00	300.00	45.00	12.40

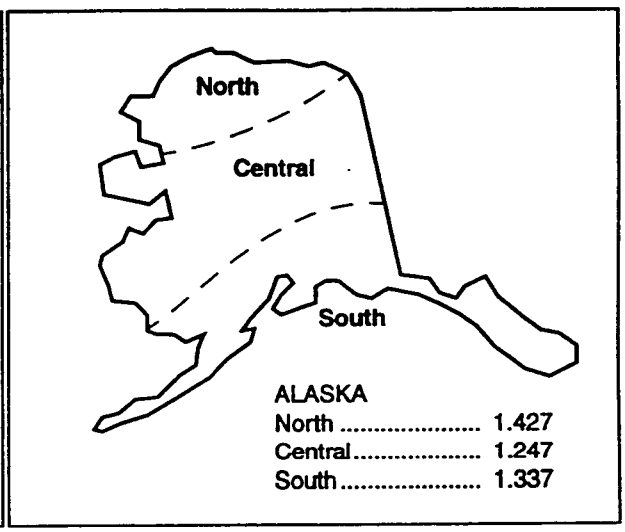
REGIONAL ADJUSTMENT MAPS

The following regional adjustments may be used to modify the average equipment rates shown in this section. These adjustments reflect regional variations in factors that affect equipment ownership costs. Adjustments for extreme variations within regions should be considered separately. To make regional adjustments, multiply the average rate by the factor listed for the specific region. For example:

Average Monthly Rate	= $550.00
Regional Adjustment Factor	= x 1.07
Adjusted Monthly Rate	= $588.50

Regional adjustment factors apply only to the rental rates; they are not meant to be adjustments to the "Estimated Operating Cost $/Hr." For a complete statement on the *Regional Adjustment Maps*, see Section 1, "INTRODUCTION."





STATES	Adjustment
Alabama	.926
Alaska – North	1.427
Central	1.247
South	1.337
Arizona	.875
Arkansas	.918
California – North	1.014
South	.963
Colorado	.919
Connecticut	1.037
Delaware	.952
District of Columbia	.960
Florida	.951
Georgia	.932
Hawaii	1.016
Idaho	.910
Illinois	1.014
Indiana	.985
Iowa	.951
Kansas	.937
Kentucky	.970
Louisiana	.942
Maine	.945
Maryland	.929
Massachussetts	1.031
Michigan	1.012
Minnesota	1.112
Mississippi	.919
Missouri	.978
Montana	1.012
Nebraska	.912
Nevada	.941
New Hampshire	.929
New Jersey	.962
New Mexico	.822
New York	1.079
North Carolina	.919
North Dakota	.990
Ohio	.996
Oklahoma	.918
Oregon	.938
Pennsylvania	1.040
Rhode Island	1.021
South Carolina	.909
South Dakota	1.002
Tennessee	.930
Texas	.889
Utah	.865
Vermont	.937
Virginia	.949
Washington	.978
West Virginia	.993
Wisconsin	1.080
Wyoming	1.027

ISLANDS	Adjustment
Guam	1.040
Marshall Islands	1.046
Puerto Rico	.906
Virgin Islands	.906

GENERAL DECISION UT000033 09/29/00 UT33
General Decision Number UT000033

Superseded General Decision No. UT990033

State: Utah

Construction Type:
HIGHWAY

County(ies):
TOOELE

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	02/11/2000
1	09/29/2000

COUNTY(ies):
TOOELE

* ELEC0354C 06/01/2000

	Rates	Fringes
ELECTRICIANS	22.62	6.17+4.2%

SUUT3013A 03/27/1992

	Rates	Fringes
CARPENTERS	16.28	2.63
CEMENT MASONS	11.00	
FLAGGERS	7.10	1.60
LABORERS:		
General Laborer, Fence Erector Laborer	12.27	2.77
Concrete Laborer (Compaction, Underground Fine Grading, Operation of Shute or Bucket)	12.27	2.77
Grade Laborer (Uses Hand Held Level To Check Grade, Inserts Grade Stakes In Concrete)	12.27	2.77
Asphalt Raker Laborer	12.70	2.64
Pipelayer (Smoothe sides and Bottoms of Trenches, Doe Rigging of Pipe, Assembles and Installs Concrete and Tile Pipe)	12.82	2.64
Laborer, Power Tools Cutting Torch, Operaters of Gasoline, Electric or Pneumatic Tools,(E.G. Compressor, Compactor, Jackhammer, Vibrator, Concrete Saw, Chain Saw, and Concrete Cutting Torch)	12.82	2.64
Laborer, Sand Blaster (Surfaces That Will Not Be Repainted Exept For Highway Stripping)	12.27	2.77

000419

POWER EQUIPMENT OPERATORS:		
Backhoe/Loader Comb	21.05	7.08
Backhoe, All Sizes	17.85	6.96
Blade, Rough	21.35	7.63
Blade, Smoothe/Finish	19.72	7.22
Bulldozer, D7 or Less	20.15	7.08
Bulldozer, Over D7	21.05	7.23
Cranes, All Sizes	17.47	6.93
Heavy Duty Repairman	17.94	6.93
Loader, All Sizes	19.77	7.13
Paver, Asphalt	17.15	7.23
Roller, Asphalt	17.62	7.29
Roller Grader	17.47	6.73
Screedman	18.10	6.94
Sheepfoot Compactor	18.10	6.94
Tractor, Small rubber tire	24.20	.58
Tractor, w/Attachment	20.15	7.23
TRUCK DRIVERS:		
Dump Trucks - Water Level Capacity (Bottom, End and Side), Including Dumpster Truck, Turnawagons, Turna-rockers and Dumpcrete):		
8 cu. yds. and Less than 14 cu. yds.	15.99	5.70
14 cu. yds. and Less than 35 cu. yds.	16.91	5.57
Water, Fuel and Oil Trucks:		
1200 Gallons to less than 2500 Gallons	17.19	5.87
2500 Gallons to less than 4000	17.88	5.87
4000 Gallons to less than 6000	16.29	5.52
Oiler Spreader Operator Where Boot Man is not required	17.72	5.90
Pickup Truck	17.21	5.70

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter

* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

000421

GENERAL SERVICES ADMINISTRATION

41 CFR Parts 301–4 and 302–2

[FTR Amendment 42]

RIN 3090–AF64

Federal Travel Regulation; Privately Owned Vehicle Mileage Reimbursement

AGENCY: Federal Supply Service, GSA.

ACTION: Final rule.

SUMMARY: This final rule amends the Federal Travel Regulation (FTR) to implement provisions of the Treasury, Postal Service, and General Government Appropriations Act for Fiscal Year 1995 (Pub. L. 103–329, September 30, 1994). The Act eliminates the fixed statutory ceilings on mileage reimbursement rates for advantageous use of a privately owned vehicle (POV) on official business travel, and allows the Administrator of General Services to establish the rates based on cost investigations. This amendment is intended to provide equitable reimbursement to a Federal employee for advantageous use of a POV on official business travel by increasing the mileage reimbursement rates to reflect current costs per mile of operating a POV; and by increasing the mileage reimbursement rates for use of a POV in lieu of a Government-furnished vehicle (GFV) to reflect current costs to an agency of operating a GFV.

DATES: This final rule is effective January 1, 1995, and applies to travel performed on or after January 1, 1995.

FOR FURTHER INFORMATION CONTACT: Robert A. Clauson, General Services Administration, Transportation Management Division (FBX), Washington, DC 20406, telephone 703–305–5745.

SUPPLEMENTARY INFORMATION: This final rule amends the Federal Travel Regulation (FTR) to establish increased mileage reimbursement rates for use of a privately owned vehicle (POV) while performing official business travel.

Mileage reimbursement rates for advantageous use of a POV have been constrained by statute at 25 cents per mile for a privately owned automobile (established in June 1991), 45 cents per mile for a privately owned airplane (established in October 1980), and 20 cents per mile for a privately owned motorcycle (established in October 1980) even though cost studies have indicated that higher reimbursement rates were necessary to adequately reimburse the cost of operating a POV.

Section 634 of the Treasury, Postal Service, and General Government Appropriations Act for Fiscal Year 1995 (Pub. L. 103–329, September 30, 1994) eliminated the fixed statutory caps and allows the Administrator of General Services to establish mileage reimbursement rates based on cost investigations which the General Services Administration (GSA) is required under 5 U.S.C. 5707(b)(1) to periodically conduct and report to Congress. Under the new law, the mileage reimbursement rate for advantageous use of a privately owned automobile may not exceed the Internal Revenue Service (IRS) business standard mileage rate in any year the IRS establishes such a single rate.

GSA has reported the results of its November 1994 cost investigation to Congress and indicated that the governing regulation would be revised to increase the mileage allowance for advantageous use of a privately owned automobile from 25 cents per mile to 30 cents per mile, for use of a privately owned airplane from 45 cents per mile to 88.5 cents per mile, and for use of a privately owned motorcycle from 20 cents per mile to 24.5 cents per mile. Additionally, based on updated data reflecting current costs to an agency of operating a GFV, GSA has increased the two-tiered reimbursement rates for use of a POV instead of a GFV from 18 cents to 23.5 cents per mile and from 9.5 cents to 10.5 cents per mile.

GSA has determined that this rule is not a significant regulatory action for the purposes of Executive Order 12866 of September 30, 1993. This final rule is not required to be published in the FEDERAL REGISTER for notice and comment. Therefore, the Regulatory Flexibility Act does not apply.

List of Subjects in 41 CFR Part 301–4

Government employees, Travel, Travel allowances, Travel and transportation expenses

List of Subjects in 41 CFR Part 302–2

Government employees, Relocation allowances and entitlements, Transfers

For the reasons set out in the preamble, 41 CFR parts 301–4 and 302–2 are amended to read as follows:

PART 301–4—REIMBURSEMENT FOR USE OF PRIVATELY OWNED CONVEYANCES

1. The authority citation for part 301–4 continues to read as follows:

Authority: 5 U.S.C. 5701–5709; E.O. 11609, 36 FR 13747, 3 CFR, 1971–1975 Comp., p. 586.

2. Section 301–4.2 is amended by revising paragraph (a); removing paragraph (b); redesignating paragraphs (c) and (d) as paragraphs (b) and (c) respectively; by removing the number "25" every place it appears in new paragraph (c), and adding in its place the number "30"; and by removing the phrase "paragraphs (d)(1) and (2)" in new paragraph (c)(3), and adding in its place the phrase "paragraphs (c) (1) and (2)", to read as follows:

§ 301–4.2 When use of a privately owned conveyance is advantageous to the Government.

(a) *Authorized mileage reimbursement rates.* When the use of a privately owned conveyance is authorized or approved as advantageous to the Government for the performance of official travel, either within or outside the United States, as provided in § 301–2.2(d)(3) of this chapter, reimbursement to the traveler shall be at the mileage rates prescribed in this paragraph.

(1) For use of a privately owned automobile: 30 cents per mile.

(2) For use of a privately owned airplane: 88.5 cents per mile.

(3) For use of a privately owned motorcycle: 24.5 cents per mile.

* * * * *

§ 301–4.4 [Amended]

3. Section 301–4.4 is amended by removing the number "18.0" wherever it appears in the section, and adding in its place the number "23.5"; and by removing the number "9.5" where it appears in paragraph (c), and adding in its place the number "10.5".

PART 302–2—ALLOWANCES FOR SUBSISTENCE AND TRANSPORTATION

4. The authority citation for part 302-2 continues to read as follows:

Authority: 5 U.S.C. 5721–5734; 20 U.S.C. 905(a); E.O. 11609, 36 FR 13747, 3 CFR, 1971–1975 Comp., p. 586.

§ 302–2.3 [Amended]

5. Section 302–2.3 is amended by removing the reference "§ 301–4.2(a)(2)" where it appears in the introductory text of paragraph (c), and by adding in its place the reference "§ 301–4.2(a)(1)".

Dated: December 15, 1994.

Julia M. Stasch,

Acting Administrator of General Services.

[FR Doc. 94–31790 Filed 12–23–94; 8:45 am]

BILLING CODE 6820–24–F

GENERAL SERVICES ADMINISTRATION

41 CFR Chapter 301

[FTR Amendment 41]

RIN 3090–AF55

Federal Travel Regulation; Maximum Per Diem Rates

AGENCY: Federal Supply Service, GSA.

ACTION: Final rule.

SUMMARY: An analysis of lodging and meal cost survey data reveals that the listing of maximum per diem rates for locations within the continental United States (CONUS) should be updated to provide for the reimbursement of Federal employees' expenses covered by per diem. This final rule, among other things, increases/decreases the maximum lodging and meals and incidental expenses amounts in certain existing per diem localities, adds new per diem localities, and modifies the defined per diem area for Flagstaff and Grand Canyon, in the state of Arizona and Virginia Beach and Williamsburg, in the state of Virginia.

DATES: This final rule is effective on January 1, 1995, and applies for travel (including travel incident to a change of official station) performed on or after January 1, 1995.

FOR FURTHER INFORMATION CONTACT: Donna Cooke or Karen Kinsella, Transportation Management Division (FBX), Washington, DC 20406, telephone 703–305–5745.

SUPPLEMENTARY INFORMATION: The General Services Administration (GSA) has determined that this rule is not a significant regulatory action for the purposes of Executive Order 12866 of September 30, 1993. This final rule is not required to be published in the Federal Register for notice and comment. Therefore, the Regulatory Flexibility Act does not apply.

For the reasons set out in the preamble, under 5 U.S.C. 5701–5709, title 41, chapter 301 of the Code of Federal Regulations is amended by revising Appendix A to chapter 301 to read as follows:

CHAPTER 301—TRAVEL ALLOWANCES

APPENDIX A TO CHAPTER 301—PRESCRIBED MAXIMUM PER DIEM RATES FOR CONUS

The maximum rates listed below are prescribed under § 301–7.3(a) of this chapter for reimbursement of per d expenses incurred during official travel within CONUS (the continental United States). The amount shown in colu (a) is the maximum that will be reimbursed for lodging expenses including applicable taxes. The M&IE rate sho in column (b) is a fixed amount allowed for meals and incidental expenses covered by per diem. The per diem paym calculated in accordance with part 301–7 of this chapter for lodging expenses plus the M&IE rate may not exc the maximum per diem rate shown in column (c). Seasonal rates apply during the periods indicated.

Per diem locality		Maximum lodging amount (a)	+	M&IE rate (b)	=	Maxir per d rate (c
Key city [1]	County and/or other defined location [2, 3]					
CONUS, Standard rate		$40		$26		
(Applies to all locations within CONUS not specifically listed below or encompassed by the boundary definition of a listed point. However, the standard CONUS rate applies to all locations within CONUS, including those defined below, for certain relocation subsistence allowances. See parts 302–2, 302–4, and 302–5 of this subtitle.)						
ALABAMA						
Anniston	Calhoun	42		26		
Birmingham	Jefferson	52		30		
Dothan	Houston	43		26		
Gulf Shores	Baldwin.					
(April 1–September 30)		106		30		
(October 1–March 31)		52		30		
Huntsville	Madison	58		34		
Mobile	Mobile	55		34		
Montgomery	Montgomery	51		26		
Sheffield	Colbert	56		30		
ARIZONA						
Casa Grande	Pinal	50		30		
Chinle	Apache.					
(April 1–October 31)		93		30		
(November 1–March 31)		54		30		
Flagstaff	All points in Coconino County not covered under Grand Canyon per diem area.					
(April 1–October 31)		78		30		
(November 1–March 31)		58		30		
Grand Canyon	All points in the Grand Canyon National Park and Kaibab National Forest within Coconino County.	104		30		
Kayenta	Navajo.					
(May 1–October 14)		80		26		
(October 15–April 30)		55		26		
Phoenix/Scottsdale	Maricopa.					
(December 1–April 30)		87		34		
(May 1–November 30)		61		34		
Prescott	Yavapai	50		30		
Sierra Vista	Cochise	46		30		
Tucson	Pima County; Davis-Monthan AFB.					
(November 1–April 30)		62		30		
(May 1–October 31)		54		30		

010 000 | Overhead

			CREW	DAILY OUTPUT	LABOR-HOURS	UNIT	1998 BARE COSTS MAT.	LABOR	EQUIP.	TOTAL	TOTAL INCL O&P
048	0010	**MAIN OFFICE EXPENSE** Average for General Contractors R010-050									
	0020	As a percentage of their annual volume									
	0125	Annual volume under 1 million dollars				% Vol.				13.60%	
	0145	Up to 2.5 million dollars								8%	
	0150	Up to 4.0 million dollars								6.80%	
	0200	Up to 7.0 million dollars								5.60%	
	0250	Up to 10 million dollars								5.10%	
	0300	Over 10 million dollars								3.90%	
052	0010	**MARK-UP** For General Contractors for change R010-070									
	0100	of scope of job as bid									
	0200	Extra work, by subcontractors, add				%					10%
	0250	By General Contractor, add									15%
	0400	Omitted work, by subcontractors, deduct									5%
	0450	By General Contractor, deduct									7.50%
	0600	Overtime work, by subcontractors, add									15%
	0650	By General Contractor, add									10%
	1000	Installing contractors, on his own labor, minimum						49%			
	1100	Maximum						105.40%			
054	0012	**MATERIAL INDEX** (Appendix) For 67 major U.S. and Canadian cities									
	0022	Minimum (Las Cruces, NM)				%	93.50%				
	0040	Average					100%				
	0061	Maximum (Anchorage, AK)					128.30%				
058	0010	**OVERHEAD** As percent of direct costs, minimum R010-050				%				5%	
	0050	Average								12%	
	0100	Maximum R010-070								30%	
062	0010	**OVERHEAD & PROFIT** Allowance to add to items in this									
	0020	book that do not include Subs O&P, average				%				25%	
	0100	Allowance to add to items in this book that									
	0110	do include Subs O&P, minimum				%					5%
	0150	Average									10%
	0200	Maximum									15%
	0300	Typical, by size of project, under $100,000								30%	
	0350	$500,000 project								25%	
	0400	$2,000,000 project								20%	
	0450	Over $10,000,000 project								15%	
064	0010	**OVERTIME** For early completion of projects or where R010-110									
	0020	labor shortages exist, add to usual labor, up to				Costs		100%			
068	0010	**PERFORMANCE BOND** For buildings, minimum R010-080				Job					.60%
	0100	Maximum				"					2.50%
070	0010	**PERMITS** Rule of thumb, most cities, minimum				Job					.50%
	0100	Maximum				"					2%
082	0010	**SMALL TOOLS** As % of contractor's work, minimum R010-050				Total					.50%
	0100	Maximum				"					2%
086	0010	**TAXES** Sales tax, State, average R010-090				%	4.78%				
	0050	Maximum					7.25%				
	0200	Social Security, on first $65,400 of wages						7.65%			
	0301	Unemployment, CA, combined Federal and State, minimum R010-100					-	2.10%			
	0350	Average						4%			
	0400	Maximum						9.30%			

WHEEL LOADER GENERAL PURPOSE BUCKETS

(In lieu of standard bucket.)

Capacity	Monthly $	Weekly $	Daily $	Hourly $	Estimated Operating Cost $/Hr.
1 CY	62.00	17.00	4.00	.60	.35
1-1/4 CY	110.00	31.00	8.00	1.00	.40
1-1/2 CY	130.00	36.00	9.00	1.00	.45
1-3/4 CY	170.00	48.00	12.00	2.00	.50
2 CY	190.00	53.00	13.00	2.00	.50
2-1/2 CY	245.00	69.00	17.00	3.00	.60
3+ CY	395.00	110.00	28.00	4.00	.75

WHEEL LOADER MULTI-PURPOSE BUCKETS

Capacity	Monthly $	Weekly $	Daily $	Hourly $	Estimated Operating Cost $/Hr.
1 CY	550.00	155.00	39.00	6.00	.95
1-1/4 CY	625.00	175.00	44.00	7.00	1.05
1-1/2 CY	580.00	160.00	40.00	6.00	1.00
1-3/4 CY	650.00	180.00	45.00	7.00	1.05
2 CY	690.00	195.00	49.00	7.00	1.10
2-1/2 CY	730.00	205.00	51.00	8.00	1.15
3 & Over CY	840.00	235.00	59.00	9.00	1.30

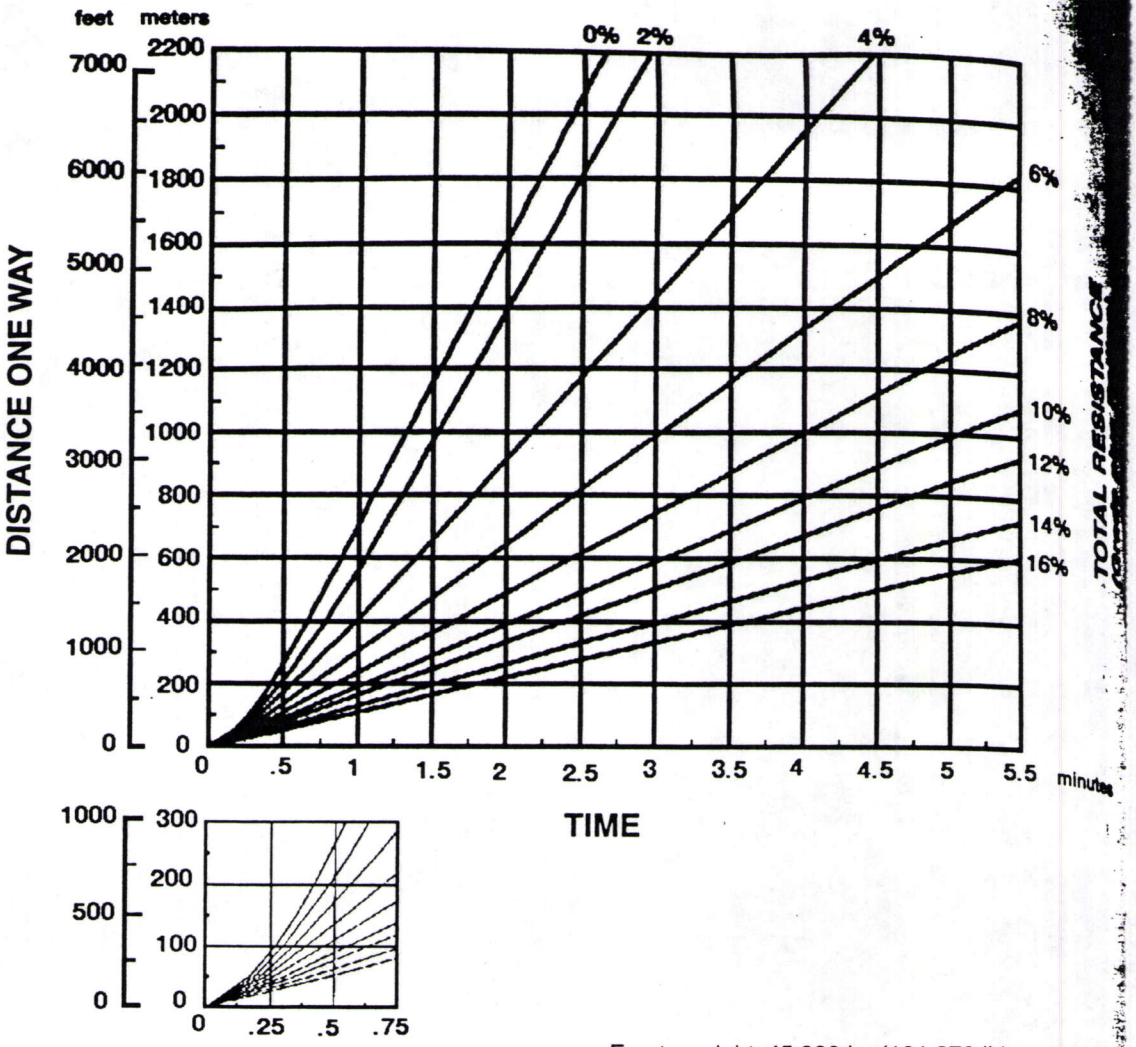
WHEEL LOADER SIDE DUMP BUCKETS

(In lieu of standard bucket.)

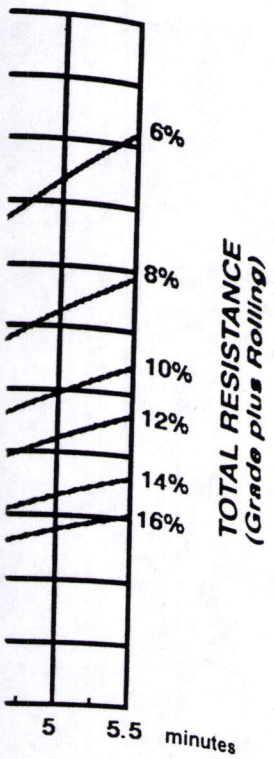
Capacity	Monthly $	Weekly $	Daily $	Hourly $	Estimated Operating Cost $/Hr.
1-1/2 CY	480.00	135.00	34.00	5.00	.85
2 CY	740.00	205.00	51.00	8.00	1.15

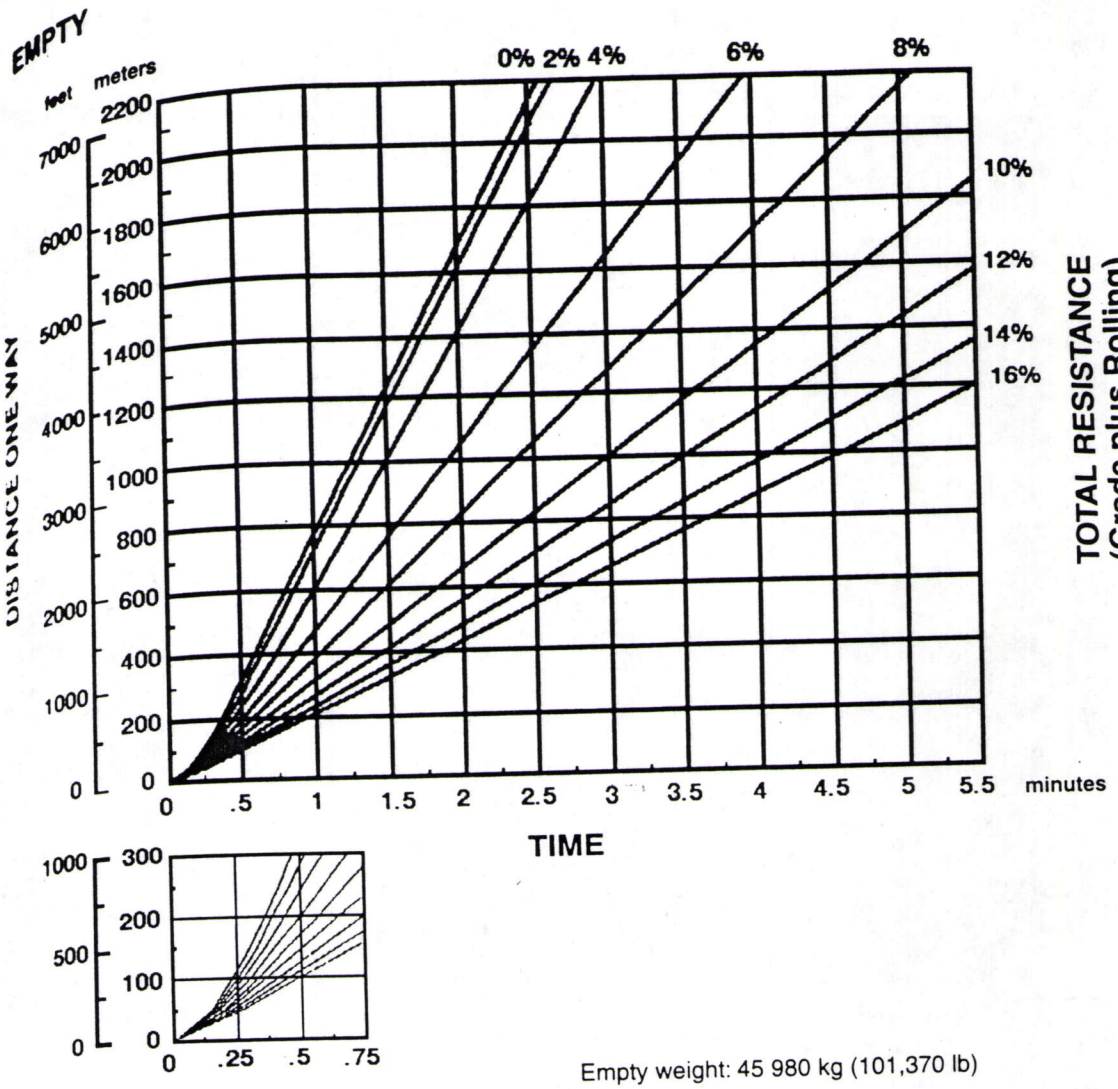
SINGLE ENGINE CONVENTIONAL SCRAPERS

Model (Yr.Disc.)	Scraper Capacity	Tractor HP	Operator Protection	Monthly $	Weekly $	Daily $	Hourly $	Estimated Operating Cost $/Hr.
DIESEL POWERED								
CATERPILLAR								
611	11.0–15.0 CY	262.2	EROPS	9,770.00	2,735.00	685.00	105.00	39.40
611	11.0–15.0 CY	262.2	ROPS	9,650.00	2,700.00	675.00	100.00	39.10
621F	14.00–20.00 CY	327.0	EROPS	12,275.00	3,435.00	860.00	130.00	48.35
621F	14.00–20.00 CY	327.0	ROPS	12,155.00	3,405.00	850.00	130.00	48.05
631E SERIES II	21.00–31.00 CY	450.0	EROPS	19,075.00	5,340.00	1,335.00	200.00	72.35
631E SERIES II	21.00–31.00 CY	450.0	ROPS	18,980.00	5,315.00	1,330.00	200.00	72.10
651E	32.00–44.00 CY	550.0	EROPS	24,345.00	6,815.00	1,705.00	255.00	89.90
TEREX								
S-24C (1999)	24–34 CY	480.0	EROPS	15,265.00	4,275.00	1,070.00	160.00	68.20
S-24C (1999)	24–34 CY	480.0	ROPS	15,210.00	4,260.00	1,065.00	160.00	68.10



Empty weight: 45 980 kg (101,370 lb)
Payload: 34 020 kg (75,000 lb)



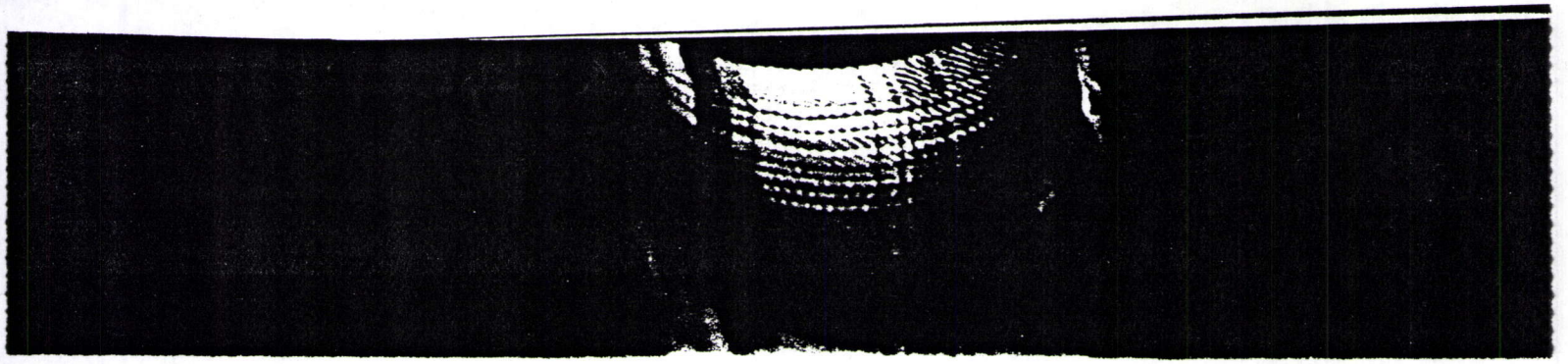


)1,370 lb)
lb)

Empty weight: 45 980 kg (101,370 lb)

9

	ZONE A Moderate	ZONE B Average	ZONE C Severe
FELLER BUNCHERS	Continuous felling and stacking in good underfoot conditions. Flat ground uniform trees below 305 mm (12 inches). 18,000 Hr	Continuous cycling in good underfoot conditions. Rolling terrain, some trees up to 508 mm (20 inches) or some hardwoods. 15,000 Hr	Continuous cycling in steep terrain over stumps and fallen trees. Most trees 508 mm (20 inches) or larger hardwoods. 10,000 Hr
BACKHOE LOADERS	Light duty utility applications in light to medium soil. Trenching depths less 1.83 m (6 ft.) 12,000 Hr	Utility applications in medium to heavy soil. Occasional use of constant flow implements. Dig depths to 3.05 m (10 ft.) 10,000 Hr	Production applications or digging in rock. Regular use of constant flow implements. Dig depths over 3.05 m (10 ft.) 5,000 Hr
SKIDDERS Wheel Track	Intermittent skidding for short distances, no decking. Good underfoot conditions: level terrain, dry floor, few if any stumps. 10,000 Hr 12,000 Hr	Continuous turning, steady skidding for medium distances with moderate decking. Good underfooting: dry floor with few stumps and gradual rolling terrain. 8,000 Hr 10,000 Hr	Continuous turning, steady skidding for long distances with frequent decking. Poor underfoot conditions: wet floor, steep slopes and numerous stumps. 7,200 Hr 8,000 Hr
PIPELAYERS 561M-572R 583R-589	Little or no use in mud, water or on rock. Use on level, regular surfaces. 20,000 Hr 25,000 Hr	Typical pipelayer use in operating conditions ranging from very good to severe. 15,000 Hr 20,000 Hr	Continuous use in deep mud or water or on rock surfaces. 10,000 Hr 15,000 Hr
WHEEL TRACTOR-SCRAPERS 613C Series II, 611, 615C Series II 621F-627F, 631E-657E	Level or favorable hauls on good haul roads. No impact. Easy-loading materials. 12,000 Hr 22,000 Hr	Varying loading and haul road conditions. Long and short hauls. Adverse and favorable grades. Some impact. Typical road-building use on a variety of jobs. 10,000 Hr 17,000 Hr	High impact condition, such as loading ripped rock. Overloading. Continuous high total resistance conditions. Rough haul roads. 8,000 Hr 12,000 Hr
CONSTRUCTION & MINING TRUCKS & TRACTORS 769D-777D 784C-797	Continuous operation at an average gross weight less than recommended. Excellent haul roads. No overloading, low load factor. (See Hourly Fuel Consumption section for definition). 50,000 Hr 60,000 Hr	Continuous operation at an average gross weight approaching recommended. Minimal overloading, good haul roads, moderate load factor. (See Hourly Fuel Consumption section for definition). 40,000 Hr 50,000 Hr	Continuous operation at or above maximum recommended gross weight. Overloading, poor haul roads, high load factor. (See Hourly Fuel Consumption section for definition). Note — Continual loading beyond recommended maximum gross weight will further reduce Zone C hours. 30,000 Hr 40,000 Hr



APPENDIX 15

(Production Rate of Wheeled Tractor-Scraper)

MODEL	621F		631E Series II		651E	
Nominal Power: Tractor	272 kW	365 hp	335/365 kW	450/490 hp	410/452 kW	550/605 hp
Bowl, Operating Weight	37 760 kg	83,250 lb	45 980 kg	101,370 lb	66 575 kg	146,770 lb
Struck Capacity (Heaped)	15.96 m³	21 yd³	23.7 m³	31 yd³	33.6 m³	44 yd³
Payload	21 775 kg	48,000 lb	34 020 kg	75,000 lb	47 175 kg	104,000 lb
Gross Operating Weight	57 950 kg	127,750 lb	80 000 kg	176,370 lb	113 750 kg	250,770 lb
Auger ATTACHMENT	1320 mm	4'4"	1524 mm	5'0"	1676 mm	5'6"
Auger Diameter	Variable 55 to 35 RPM		Variable 55 to 35 RPM		Variable 55 to 35 RPM	
Auger RPM	149 kW	200 hp	201 kW	270 hp	354 kW	475 hp
Auger Power	273 L/min	72 gpm	378 L/min	100 gpm	549 L/min	145 gpm
Hydraulic Flow	—	—	—	—	132 L/min	35 gpm
Steering Flow	41 370 kPa	6000 psi	37 895 kPa	5500 psi	41 370 kPa	5700 psi
System Pressure	electronic		electronic		electronic	
Auger Control						

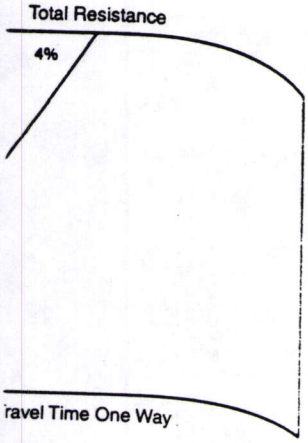
• Operating weight includes standard machine, coolant, lubricants, full fuel tank and operator.

The auger scraper is a self-loading system that offers an alternative to conventional, push-pull or elevating scrapers. An independent hydrostatic system powers the auger which is located near the center of the bowl. The rotating auger lifts and evenly distributes over 50% of the material that flows over the scraper cutting edge. This action reduces the cutting edge resistance allowing the wheel tractor-scraper to continue moving through the cut and quickly obtain full rated loads.

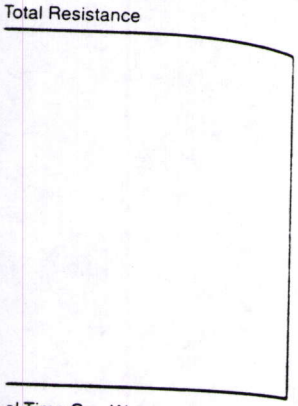
Advantages:

- Can load in equal or less time
- Requires shorter cut distance
- Complete material ejection
- Hydraulic ejector pushes material)
- Significantly reduces dust problems
- Less material
- Increased tire life
- Broader material appetite
- Better material retention on haul road (closed apron instead of open elevator)

9



or the Empty machine, rea:
nce (one way) scale at 760 m
the 0% total resistance lin
) read down to the Travel Tim
ermine return time = 1 min



Cycle Time —
= load* + haul + maneuver & spread* + return
= 0.6 + 1.4 + 0.7 + 1.0
= 3.7 min.

*For fixed time (load, maneuver and spread) see the table below.

When cycle time and payload are known, productivity can be calculated. For a more complex example see the Earthmoving Section.

●●●

TYPICAL FIXED TIMES FOR SCRAPERS

(Times may vary depending on job conditions)

Model	Loaded By	Load Time (Min.)	Maneuver and Spread or Maneuver and Dump (Min.)
613C Series II	Self	0.9	0.7
615C Series II	Self	0.9	0.7
623F	Self	0.9	0.7
633E Series II	Self	0.9	0.7
611	One D6R	0.5	0.7
621F	One D8R	0.5	0.7
627F	One D8R	0.5	0.6
621F	One D9R	0.4	0.7
627F	One D9R	0.4	0.6
627F PP	Self	0.9*	0.6
631E Series II	One D9R	0.6	0.7
637E Series II	One D9R	0.6	0.6
631E Series II	One D10R	0.5	0.7
637E Series II	One D10R	0.5	0.6
637E/PP Series II	Self	1.0*	0.6
651E	One D11R	0.6	0.7
657E	One D11R	0.6	0.6
657E	Push Pull	1.1*	0.6
	Self		
621F	Auger	0.9	0.7
627F	Auger	0.7	0.7
631E Series II	Auger	0.9	0.7
637E Series II	Auger	0.8	0.7
651E	Auger	1.3	0.7
657E	Auger	1.0	0.7

*Load time per pair, including transfer time.

NOTE: Empty Weights shown on the Wheel Tractor-Scraper charts includes ROPS Canopy. The travel times will remain within acceptable limits when applied to a non-ROPS equipped machine. When calculating TMPH loadings *any* additional weight must be considered in establishing mean tire loads.

USE OF RETARDER CURVES

The following explanation applies to retarder curves for Wheel Tractor-Scrapers and Articulated Trucks.

The speed that can be maintained (without use of service brake) when the machine is descending a grade with retarder fully on can be determined from the retarder curves in this section if gross machine weight and total effective grade are known.

Total Effective Grade (or Total Resistance) is grade assistance *minus* rolling resistance.

10 kg/metric ton (20 lb/U.S. ton) = 1% adverse grade.

9

Example

15% favorable grade with 5% rolling resistance. Find Total Effective Grade.

Total Effective Grade = 15% Grade Assistance — 5%

Rolling Resistance = 10% Total Effective Grade Assistance.

Example problem:

A 651E with an estimated payload of 47 175 kg (104,000 lb) descends a 10% total effective grade. Find constant speed and gear range with maximum retarder effort. Find travel time if the slope is 610 m (2000 ft) long.

Empty Weight + Payload = Gross Weight
= 60 950 kg + 47 175 kg = 108 125 kg
(134,370 lb + 104,000 lb = 238,370 lb)

		020 550 | Site Demolition	CREW	DAILY OUTPUT	LABOR-HOURS	UNIT	1998 BARE COSTS MAT.	LABOR	EQUIP.	TOTAL	TOTAL INCL O&P
554	2200	Reinforced	B-38	24	1.667	C.Y.		40	41.50	81.50	108
	2300	With hand held air equipment, bituminous, to 6" thick	B-39	1,900	.025	S.F.		.56	.09	.65	.98
	2320	Concrete to 6" thick, no reinforcing		1,200	.040			.89	.14	1.03	1.56
	2340	Mesh reinforced		1,400	.034			.76	.12	.88	1.34
	2360	Rod reinforced		765	.063			1.40	.23	1.63	2.44
	2400	Curbs, concrete, plain	B-6	360	.067	L.F.		1.54	.59	2.13	3.03
	2500	Reinforced		275	.087			2.01	.78	2.79	3.98
	2600	Granite		360	.067			1.54	.59	2.13	3.03
	2700	Bituminous		528	.045			1.05	.40	1.45	2.08
	2900	Pipe removal, sewer/water, no excavation, 12" diameter		175	.137			3.16	1.22	4.38	6.25
	2930	15" diameter		150	.160			3.68	1.43	5.11	7.25
	2960	24" diameter		120	.200			4.61	1.78	6.39	9.10
	3000	36" diameter		90	.267			6.15	2.38	8.53	12.15
	3200	Steel, welded connections, 4" diameter		160	.150			3.45	1.34	4.79	6.80
	3300	10" diameter		80	.300			6.90	2.67	9.57	13.70
	3500	Railroad track removal, ties and track	B-13	330	.170			3.90	2.38	6.28	8.65
	3600	Ballast	B-14	500	.096	C.Y.		2.14	.43	2.57	3.82
	3700	Remove and re-install, ties & track using new bolts & spikes		50	.960	L.F.		21.50	4.27	25.77	38
	3800	Turnouts using new bolts and spikes		1	48	Ea.		1,075	214	1,289	1,900
	4000	Sidewalk removal, bituminous, 2-1/2" thick	B-6	325	.074	S.Y.		1.70	.66	2.36	3.36
	4050	Brick, set in mortar		185	.130			2.99	1.16	4.15	5.90
	4100	Concrete, plain, 4"		160	.150			3.45	1.34	4.79	6.80
	4200	Mesh reinforced		150	.160			3.68	1.43	5.11	7.25
	5000	Slab on grade removal, plain	B-5	45	1.244	C.Y.		29	22.50	51.50	69.50
	5100	Mesh reinforced		33	1.697			39.50	30.50	70	94.50
	5200	Rod reinforced		25	2.240			52	40.50	92.50	126
	5500	For congested sites or small quantities, add up to								200%	200%
	5550	For disposal on site, add	B-11A	232	.069			1.68	3.59	5.27	6.55
	5600	To 5 miles, add	B-34D	76	.105			2.56	7.20	9.76	11.80
		020 600 | Building Demolition									
604	0010	**BUILDING DEMOLITION** Large urban projects, incl. 20 Mi. haul									
	0012	Excludes dump fee, C.F. is volume of building standing, steel	B-8	21,500	.003	C.F.		.07	.10	.17	.22
	0050	Concrete		15,300	.004			.10	.15	.25	.32
	0080	Masonry		20,100	.003			.08	.11	.19	.24
	0100	Mixture of types, average		20,100	.003			.08	.11	.19	.24
	0500	Small bldgs, or single bldgs, no salvage included, steel	B-3	14,800	.003			.08	.11	.19	.25
	0600	Concrete		11,300	.004			.10	.15	.25	.32
	0650	Masonry		14,800	.003			.08	.11	.19	.25
	0700	Wood		14,800	.003			.08	.11	.19	.25
	1000	Single family, one story house, wood, minimum				Ea.				2,300	2,700
	1020	Maximum								4,000	4,800
	1200	Two family, two story house, wood, minimum								3,000	3,600
	1220	Maximum								5,800	7,000
	1300	Three family, three story house, wood, minimum								4,000	4,800
	1320	Maximum								7,000	8,400
608	0010	**DISPOSAL ONLY** Urban buildings with salvage value allowed									
	0020	Including loading and 5 mile haul to dump									
	0200	Steel frame	B-3	430	.112	C.Y.		2.63	3.96	6.59	8.40
	0300	Concrete frame		365	.132			3.10	4.66	7.76	9.95
	0400	Masonry construction		445	.108			2.54	3.82	6.36	8.15
	0500	Wood frame		247	.194			4.58	6.90	11.48	14.70
612	0010	**DUMP CHARGES** Typical urban city, tipping fees only									
	0100	Building construction materials				Ton					60

020 700 | Selective Demolition

		CREW	DAILY OUTPUT	LABOR-HOURS	UNIT	19XX COSTS MAT.	LABOR	EQUIP.	TOTAL	TOTAL INCL O&P	
3420	On metal lath	1 Clab	300	.027	S.F.		.56		.56	.88	732
3600	Plywood, one side	B-1	1,500	.016	↓		.35		.35	.54	
3750	Terra cotta block and plaster, to 6" thick	"	175	.137	↓		2.96		2.96	4.66	
3800	Toilet partitions, slate or marble	1 Clab	5	1.600	Ea.		33.50		33.50	52.50	
3820	Hollow metal	"	8	1	"		21		21	33	
	WINDOW DEMOLITION										734
0010	Aluminum, including trim, to 12 S.F.	1 Clab	16	.500	Ea.		10.45		10.45	16.50	
0200	To 25 S.F.		11	.727	↓		15.20		15.20	24	
0240	To 50 S.F.		5	1.600			33.50		33.50	52.50	
0280	Storm windows, to 12 S.F.		27	.296			6.20		6.20	9.75	
0320	To 25 S.F.		21	.381			7.95		7.95	12.55	
0360	To 50 S.F.		16	.500			10.45		10.45	16.50	
0400	Glass, minimum		200	.040	S.F.		.84		.84	1.32	
0600	Maximum		150	.053	"		1.11		1.11	1.76	
0620	Steel, including trim, to 12 S.F.		13	.615	Ea.		12.85		12.85	20.50	
1000	To 25 S.F.		9	.889			18.60		18.60	29.50	
1020	To 50 S.F.		4	2			42		42	66	
1040	Wood, including trim, to 12 S.F.		22	.364			7.60		7.60	12	
2000	To 25 S.F.		18	.444			9.30		9.30	14.65	
2020	To 50 S.F.		13	.615			12.85		12.85	20.50	
2060	Remove and reset window, minimum	1 Carp	6	1.333			34		34	54	
5020	Average		4	2			51		51	80.50	
5040	Maximum		2	4			102		102	161	
5080											

020 750 | Concrete Removal

0010	**FOOTINGS AND FOUNDATIONS DEMOLITION**										754
0200	Floors, concrete slab on grade,										
0240	4" thick, plain concrete	B-9C	500	.080	S.F.		1.70	.35	2.05	3.07	
0280	Reinforced, wire mesh		470	.085			1.81	.37	2.18	3.27	
0300	Rods		400	.100			2.13	.43	2.56	3.84	
0400	6" thick, plain concrete		375	.107			2.27	.46	2.73	4.09	
0420	Reinforced, wire mesh		340	.118			2.51	.51	3.02	4.51	
0440	Rods		300	.133	↓		2.84	.58	3.42	5.10	
1000	Footings, concrete, 1' thick, 2' wide	B-5	300	.187	L.F.		4.33	3.37	7.70	10.45	
1080	1'-6" thick, 2' wide		250	.224			5.20	4.05	9.25	12.55	
1120	3' wide		200	.280			6.50	5.05	11.55	15.65	
1140	2' thick, 3' wide		175	.320			7.40	5.80	13.20	17.90	
1200	Average reinforcing, add								10%	10%	
1220	Heavy reinforcing, add				↓				20%	20%	
2000	Walls, block, 4" thick	A-1	200	.040	S.F.		.84	.34	1.18	1.69	
2040	6" thick		190	.042			.88	.35	1.23	1.78	
2080	8" thick		180	.044			.93	.37	1.30	1.87	
2100	12" thick		175	.046			.96	.38	1.34	1.93	
2200	For horizontal reinforcing, add								10%	10%	
2220	For vertical reinforcing, add								20%	20%	
2400	Concrete, plain concrete, 6" thick	B-9	160	.250			5.30	1.08	6.38	9.60	
2420	8" thick		140	.286			6.10	1.24	7.34	10.95	
2440	10" thick		120	.333			7.10	1.45	8.55	12.80	
2500	12" thick		100	.400			8.50	1.74	10.24	15.35	
2600	For average reinforcing, add								10%	10%	
2620	For heavy reinforcing, add								20%	20%	
4000	For congested sites or small quantities, add up to								200%	200%	
4200	Add for disposal, on site	B-11A	232	.069	C.Y.		1.68	3.59	5.27	6.55	
4250	To five miles	B-30	220	.109	"		2.79	7.15	9.94	12.10	

020 800 | Haz. Mat'l Abatement

		CREW	DAILY OUTPUT	LABOR-HOURS	UNIT	1998 BARE COSTS MAT.	LABOR	EQUIP.	TOTAL	TOTAL INCL O&P
	DECONTAMINATION CONTAINMENT AREA DEMOLITION and clean-up									
0010	Spray exposed substrate with surfactant (bridging)									
0100	Flat surfaces	A-9	6,000	.011	S.F.	.30	.33		.63	.86
0200	Irregular surfaces	"	4,000	.016	"	.35	.49		.84	1.18
0250	Pipes, beams, and columns		2,000	.032	L.F.	.60	.98		1.58	2.24
0300	Spray encapsulate polyethelene sheeting		8,000	.008	S.F.	.25	.25		.50	.68
1000	Roll down polyethelene sheeting		8,000	.008	"		.25		.25	.40
1100	Bag polyethelene sheeting		400	.160	Ea.	.70	4.91		5.61	8.65
1500	Fine clean exposed substrate, with nylon brush		2,400	.027	S.F.		.82		.82	1.32
2000	Wet wipe substrate		4,800	.013	"		.41		.41	.66
2500	Vacuum surfaces, fine brush	▼	6,400	.010	▼		.31		.31	.49
2600	Structural demolition									
3000	Wood stud walls	A-9	2,800	.023	S.F.		.70		.70	1.13
3100	Window manifolds, not incl. window replacement		4,200	.015	"		.47		.47	.75
3500	Plywood carpet protection	▼	2,000	.032	▼		.98		.98	1.58
3600	Remove custom decontamination facility	A-10A	8	3	Ea.	15.65	92.50		108.15	166
4000	Remove portable decontamination facility	3 Asbe	12	2	"	11.50	61		72.50	111
4100	HEPA vacuum, shampoo carpeting	A-9	4,800	.013	S.F.	.05	.41		.46	.72
5000	Final cleaning of protected surfaces	A-10A	8,000	.003	"		.09		.09	.15
	ENCAPSULATION WITH SEALANTS									
0010	Ceilings and walls, minimum	A-9	21,000	.003	S.F.	.25	.09		.34	.43
0100	Maximum		10,600	.006		.35	.19		.54	.69
0110	Columns and beams, minimum		13,300	.005		.25	.15		.40	.52
0200	Maximum		5,325	.012	▼	.35	.37		.72	.98
0210	Pipes to 12" diameter including minor repairs, minimum		800	.080	L.F.	.35	2.45		2.80	4.35
0300	Maximum	▼	400	.160	"	1	4.91		5.91	9
0310										
	REMOVAL OF UNDERGROUND STORAGE TANKS R020-880									
0010	Petroleum storage tanks, non-leaking									
0011	Excavate & load onto trailer									
0100	**3000 gal. to 5000 gal. tank**	B-14	4	12	Ea.		268	53.50	321.50	**480**
0110	6000 gal to 8000 gal tank	B-3A	3	13.333			297	235	532	725
0120	9000 gal to 12000 gal tank	"	2	20	▼		445	355	800	1,075
0130	Known leaking tank add				%				100%	100%
0190	Remove sludge, water and remaining product from bottom									
0200	of tank with vacuum truck									
0201	**3000 gal to 5000 gal tank**	A-13	5	1.600	Ea.		43.50	102	145.50	**179**
0300	6000 gal to 8000 gal tank		4	2			54.50	128	182.50	224
0310	9000 gal to 12000 gal tank	▼	3	2.667	▼		73	171	244	298
0320	Dispose of sludge off-site, average				Gal					3.50
0390	Insert solid carbon dioxide "dry ice" to produce inert gas									
0400	For cleaning & transporting tanks (1.5 lbs./100 gal. capacity)	1 Clab	500	.016	Lb	1.10	.33		1.43	1.74
0401	Haul tank to certified salvage dump, 100 miles round trip									
1020	**3000 gal. to 5000 gal. tank**				Ea.				525	**600**
1023	6000 gal. to 8000 gal. tank								625	690
1026	9,000 gal. to 12,000 gal. tank				▼				850	935
1029	Disposal of contaminated soil to landfill									
1100	Minimum				C.Y.					110
1110	Maximum				"					310
1111	Disposal of contaminated soil to									
1120	bituminous concrete batch plant									
1121	Minimum				C.Y.					50
1130	Maximum				"					100
1131	Decontamination of soil on site incl poly tarp on top/bottom									
2010	Soil containment berm, and chemical treatment									
2011										

022 300 | Pavement Base

			CREW	DAILY OUTPUT	LABOR-HOURS	UNIT	1998 BARE COSTS MAT.	LABOR	EQUIP.	TOTAL	TOTAL INCL O&P
304	0010	**BASE** Prepare and roll sub-base, small areas to 2500 S.Y.	B-32A	1,500	.016	S.Y.		.41	.64	1.05	1.34
	0100	Large areas over 2500 S.Y.	B-32	3,700	.009	"		.23	.44	.67	.83
308	0010	**BASE COURSE** For roadways and large paved areas									
	0050	Crushed 3/4" stone base, compacted, 3" deep	B-36B	4,600	.014	S.Y.	5.40	.35	.69	6.44	7.25
	0100	6" deep		4,500	.014		7.70	.36	.71	8.77	9.80
	0200	9" deep		3,300	.019		11.55	.49	.97	13.01	14.50
	0300	12" deep		2,700	.024		15.40	.59	1.18	17.17	19.15
	0500	Crushed 1-1/2" stone base, compacted to 4" deep		6,000	.011		5.05	.27	.53	5.85	6.60
	0501	6" deep		4,500	.014		7.70	.36	.71	8.77	9.80
	0502	8" deep		3,500	.018		10.30	.46	.91	11.67	13.05
	0503	12" deep		2,000	.032		15.35	.80	1.60	17.75	19.90
	0504	Bank run gravel, spread and compacted									
	0550	6" deep	B-32	6,000	.005	S.Y.	2.45	.14	.27	2.86	3.21
	0570	9" deep		4,900	.007		3.68	.17	.33	4.18	4.67
	0590	12" deep		3,600	.009		4.90	.23	.45	5.58	6.25
	0600	Liquid application to gravel base, asphalt emulsion	B-45	6,000	.003	Gal.	1.45	.07	.12	1.64	1.84
	0700	Prime and seal, cut back asphalt		6,000	.003	"	1.71	.07	.12	1.90	2.12
	0800	Macadam penetration crushed stone, 2 gal. per S.Y., 4" thick		6,000	.003	S.Y.	2.90	.07	.12	3.09	3.43
	1000	6" thick, 3 gal. per S.Y.		4,000	.004		4.35	.10	.18	4.63	5.15
	1100	8" thick, 4 gal. per S.Y.		3,000	.005		5.80	.14	.24	6.18	6.85
	1200	Stabilization fabric, polypropylene, 6 oz./S.Y.	B-6	10,000	.002		1.25	.06	.02	1.33	1.49
	8500	For small and irregular areas, add						50%	50%		

022 400 | Soil Stabilization

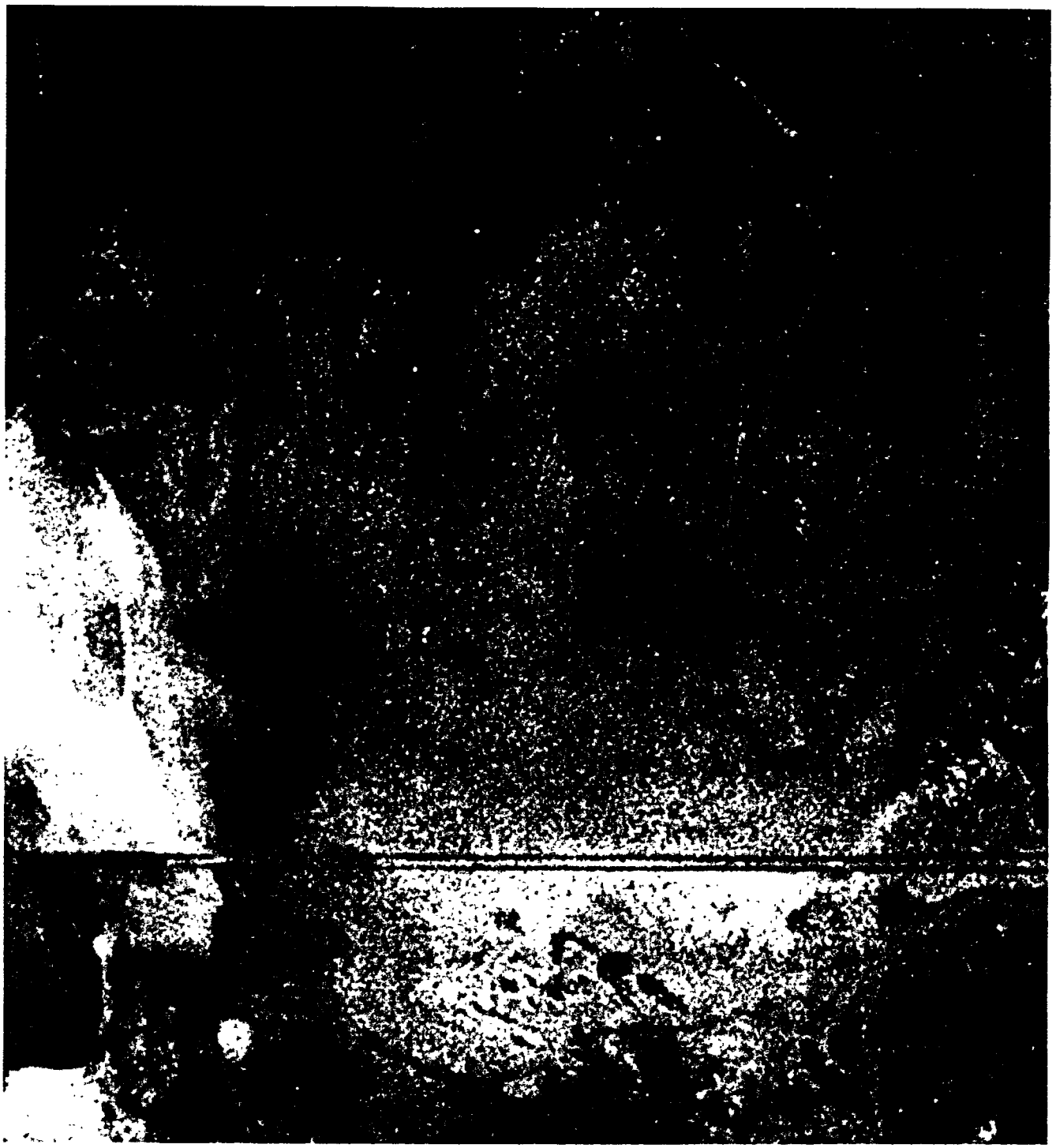
408	0010	**GROUTING, PRESSURE** Cement and sand, 1:1 mix, minimum	B-61	124	.323	Bag	8.25	7.30	2.84	18.39	23.50
	0100	Maximum		51	.784	"	8.25	17.70	6.90	32.85	44
	0200	Cement and sand, 1:1 mix, minimum		250	.160	C.F.	16.55	3.61	1.41	21.57	25.50
	0300	Maximum		100	.400		25	9.05	3.52	37.57	45.50
	0400	Epoxy cement grout, minimum		137	.292		100	6.60	2.57	109.17	123
	0500	Maximum		57	.702		100	15.85	6.20	122.05	141
	0600	Structural epoxy grout				Gal.	45			45	49.50
	0700	Alternate pricing method: (Add for materials)									
	0710	5 person crew and equipment	B-61	1	40	Day		905	350	1,255	1,800

022 500 | Vibroflotation

504	0010	**VIBROFLOTATION** R022-510									
	0900	Vibroflotation compacted sand cylinder, minimum	B-60	750	.075	V.L.F.		1.85	1.40	3.25	4.39
	0950	Maximum		325	.172			4.27	3.23	7.50	10.10
	1100	Vibro replacement compacted stone cylinder, minimum		500	.112			2.78	2.10	4.88	6.60
	1150	Maximum		250	.224			5.55	4.20	9.75	13.15
	1300	Mobilization and demobilization, minimum		.47	119	Total		2,950	2,225	5,175	7,000
	1400	Maximum		.14	400	"		9,925	7,500	17,425	23,600

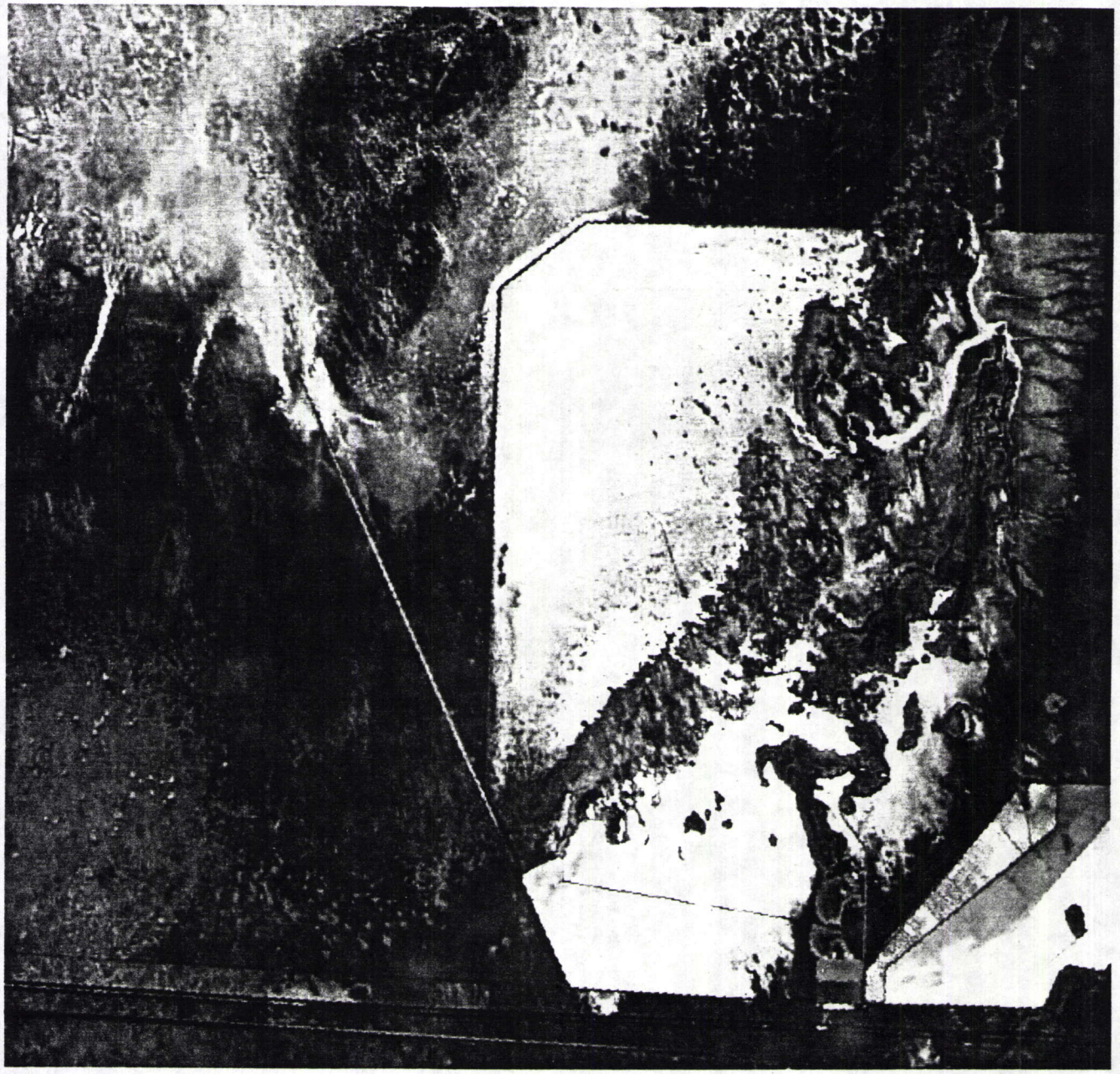
022 700 | Slope/Erosion Control

704	0010	**EROSION CONTROL** Jute mesh, 100 S.Y. per roll, 4' wide, stapled	B-80A	2,400	.010	S.Y.	.78	.21	.07	1.06	1.27
	0060	Nylon, 3 dimensional	"	700	.034		3.50	.72	.25	4.47	5.25
	0070	Paper biodegradable mesh	B-1	2,500	.010		.06	.21		.27	.40
	0080	Paper mulch	B-64	20,000	.001		.04	.02	.01	.07	.09
	0100	Plastic netting, stapled, 2" x 1" mesh, 20 mil	B-1	2,500	.010		.40	.21		.61	.77
	0200	Polypropylene mesh, stapled, 6.5 oz./S.Y.		2,500	.010		1.75	.21		1.96	2.26
	0300	Tobacco netting, or jute mesh #2, stapled		2,500	.010		.06	.21		.27	.40
	1000	Silt fence, polypropylene, ideal conditions	2 Clab	1,600	.010	L.F.	.45	.21		.66	.83
	1100	Adverse conditions	"	950	.017	"	.50	.35		.85	1.10
	1200	Place and remove hay bales	A-2	3	8	Ton	50	175	56	281	390



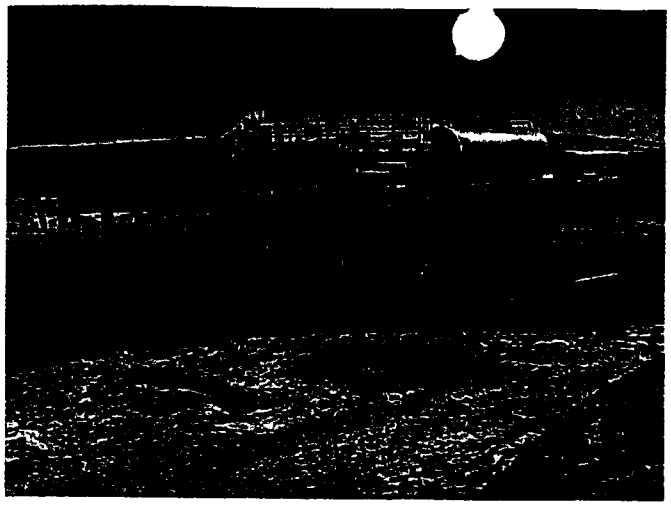
MAG CORP Area MAY 1985

000441

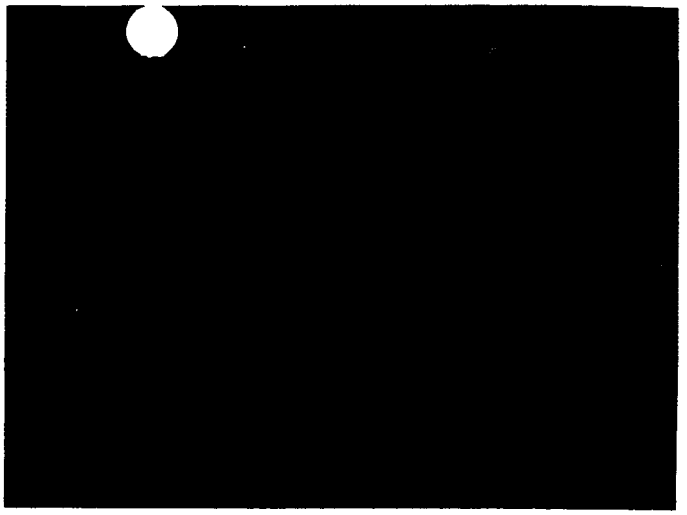


MAGCORP AUG 1998

000442



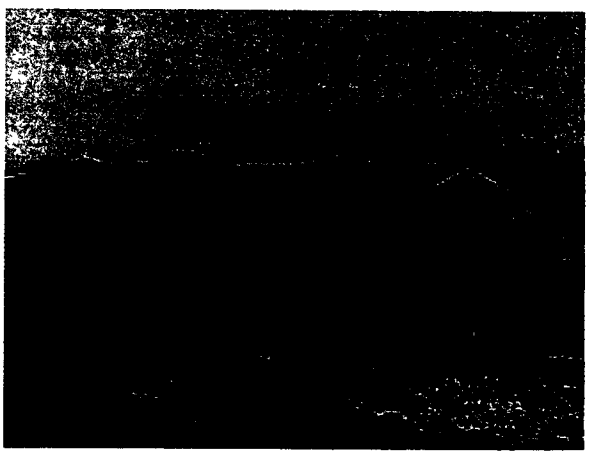
P1 Pump Station



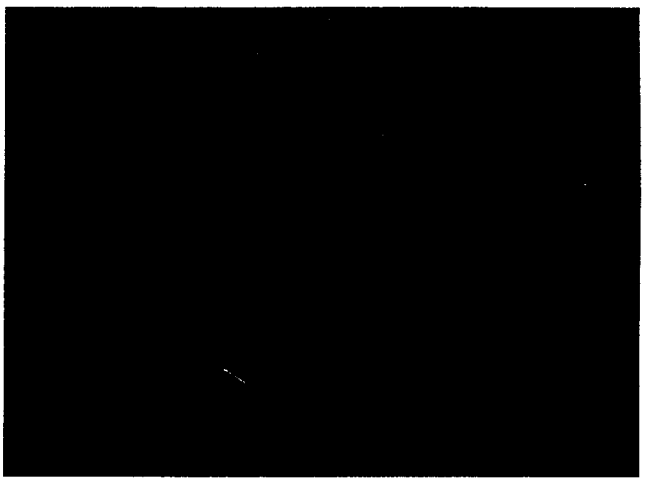
Ditch Interior to Pond 0 & Dike - North Side

Magnesium Chloride Pond West Berm North Pond

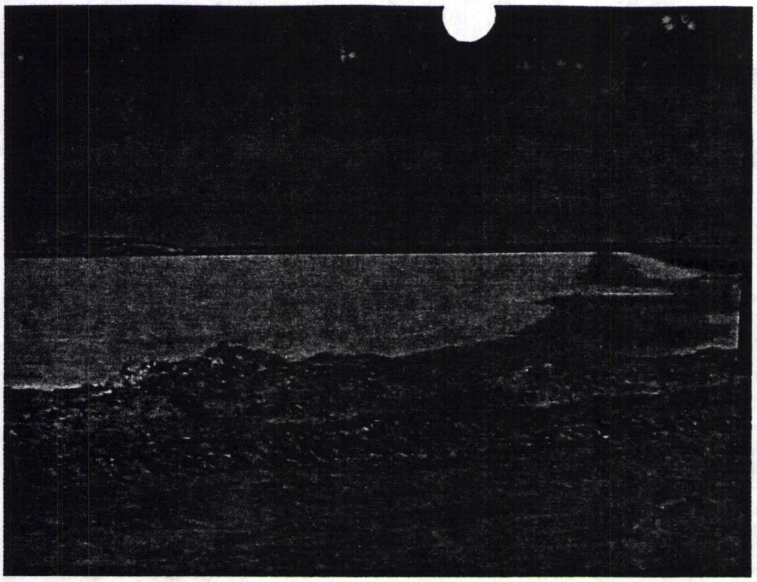
South Magnesium Chloride Pond East Berm



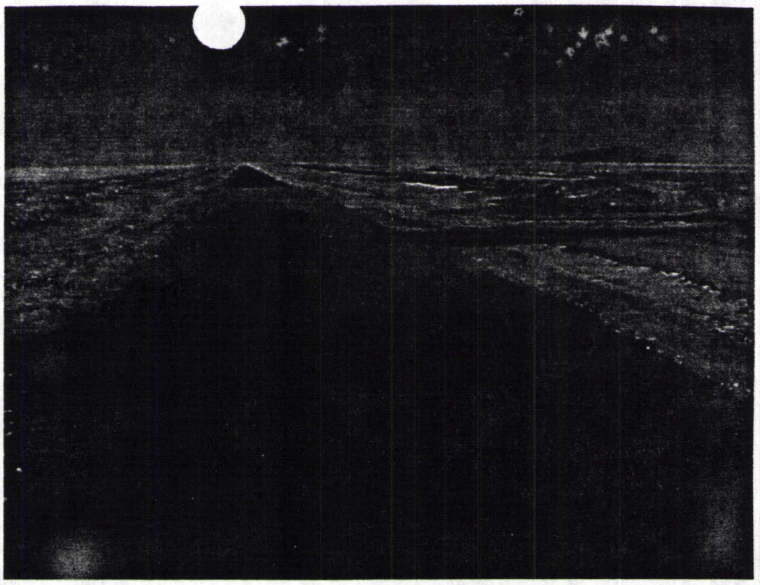
P-2 Feed Canal



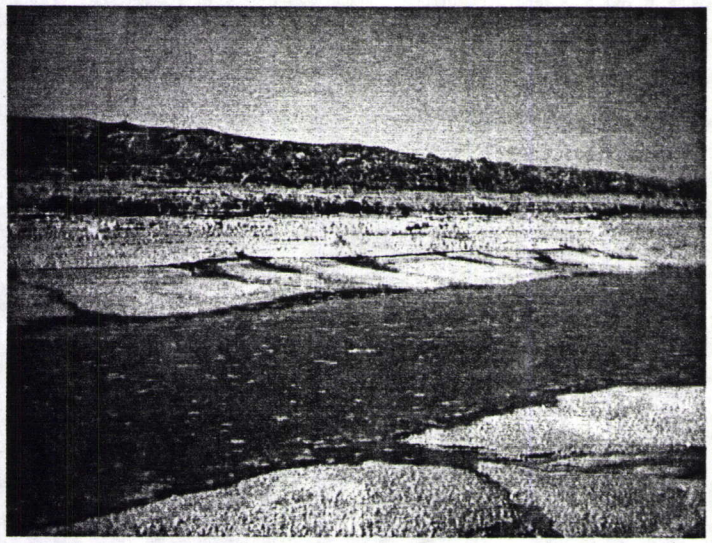
Bi-Pass Canal



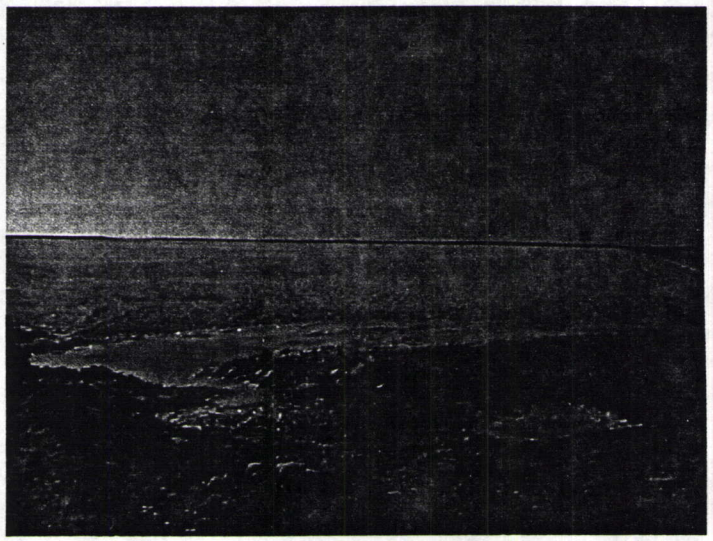
North Brine Storage Pond



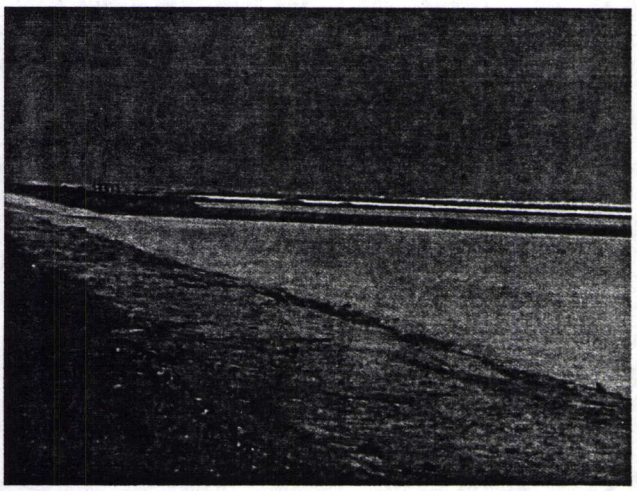
P-1 Feed Canal



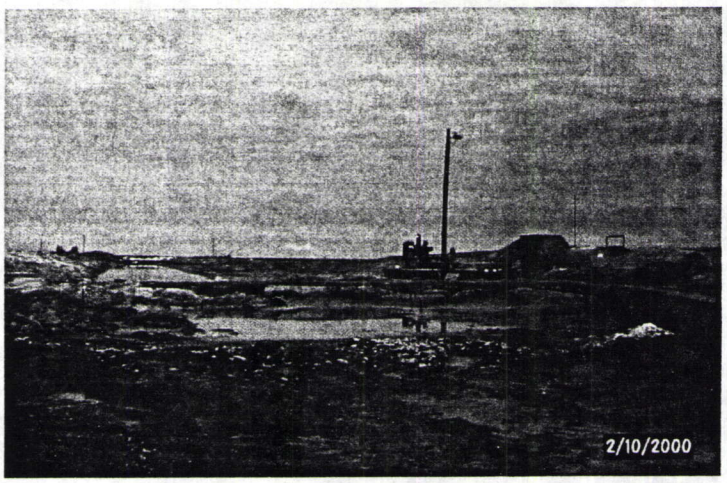
Cross Section P-1 Feed Canal



Interior Dikes



Interior Dikes at 7 Inlet Canal

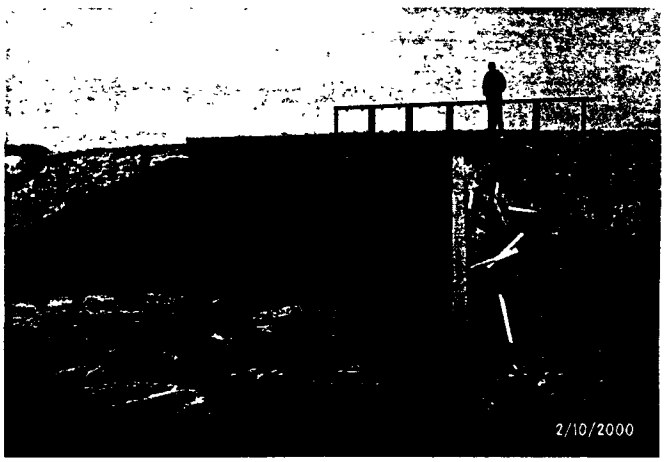


P2 Pump Station

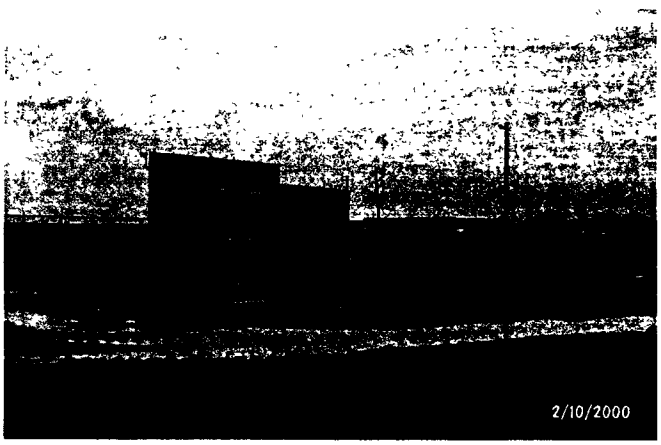
P3 Pump Station (background)

P4 Pump Stations

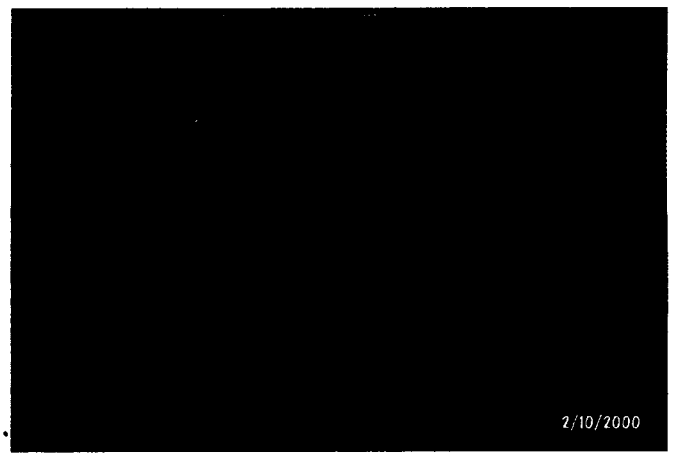
P5 Pump Station with Sump



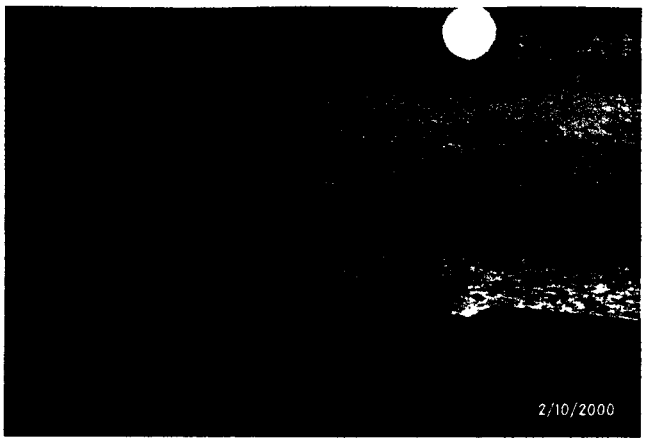
Pond 0 Gate Structure



Shop and Warehouse with Tanks

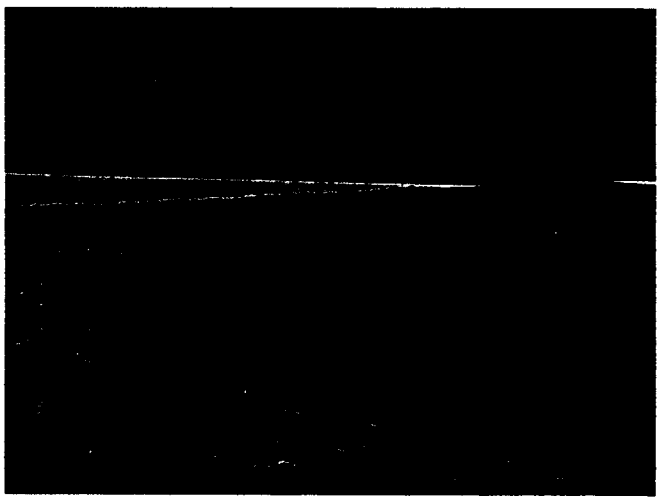


Road through the Dune Area



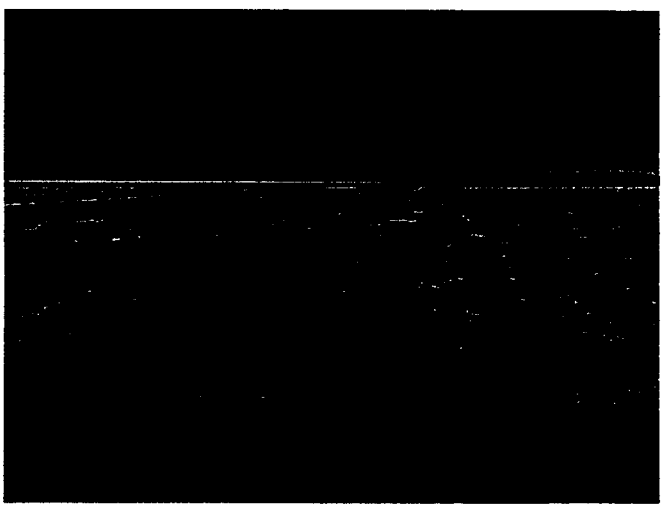
Dike Between Pond 0 and Pond 1

Pond 0 Ditch and North Roads

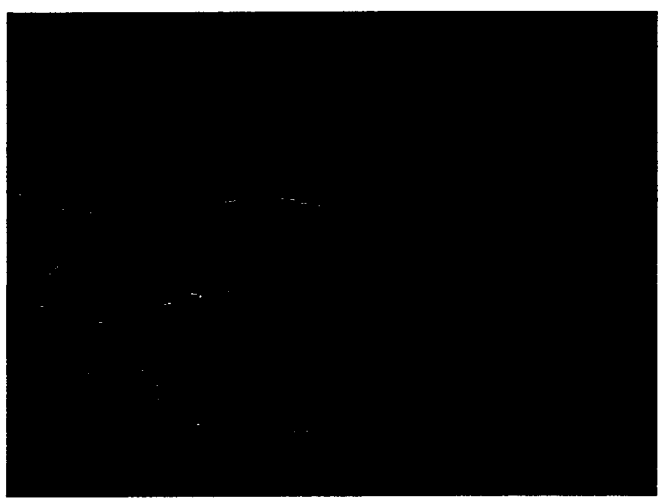


Pond 5 SW Dike

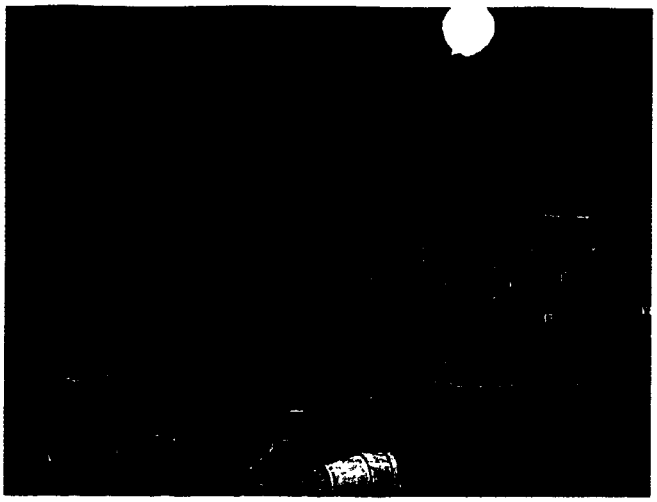
Pond 5 Top Soil Area



Pond 7D

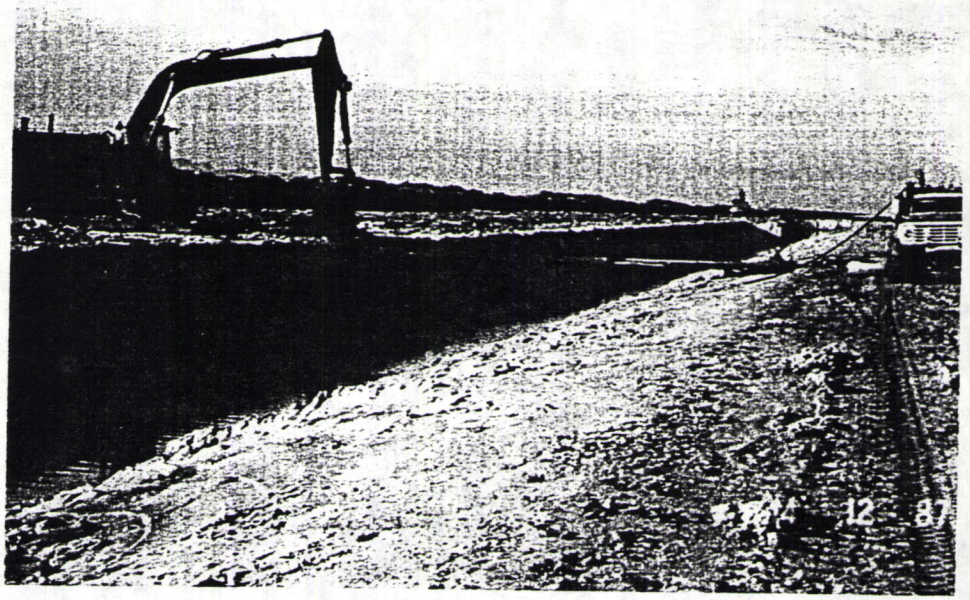


Pond 7D Ditch

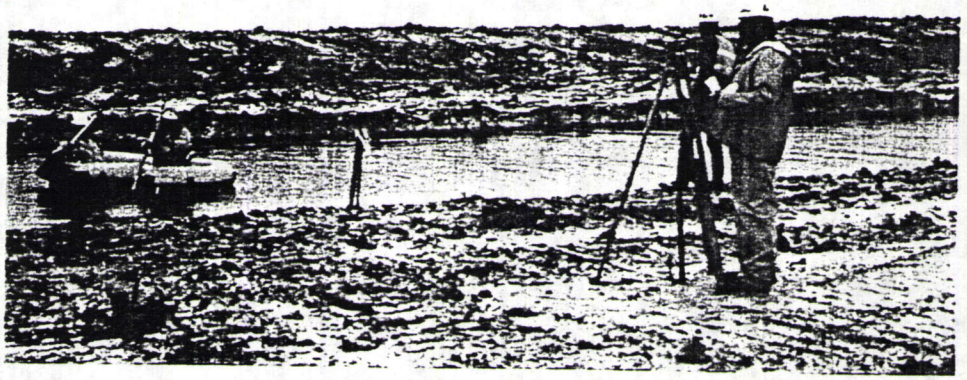


Diesel Tank at P1 Pump Station

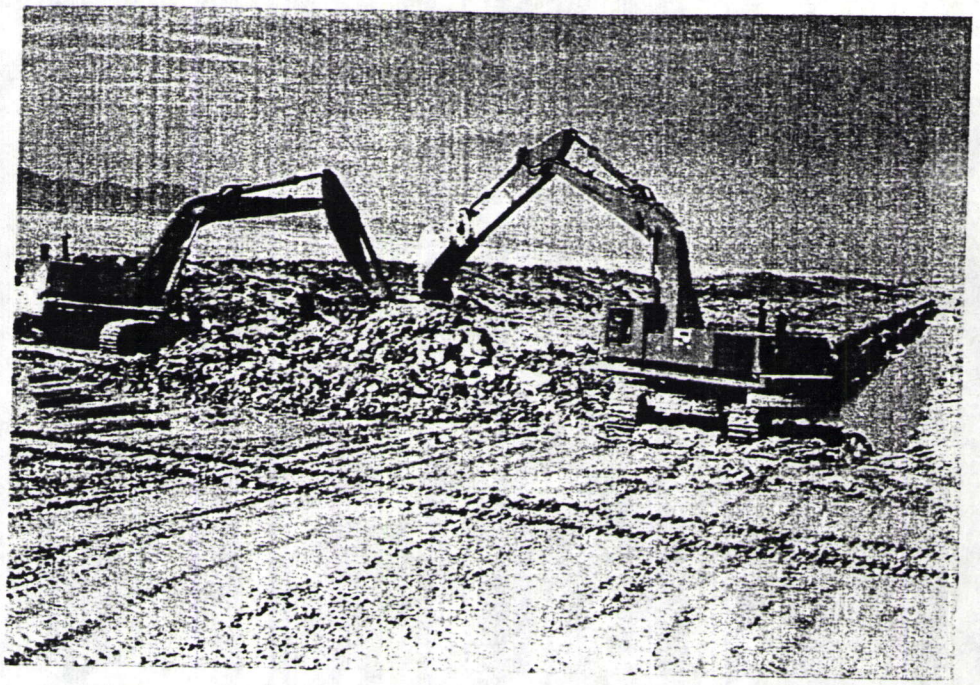
Pond 0 West Dike



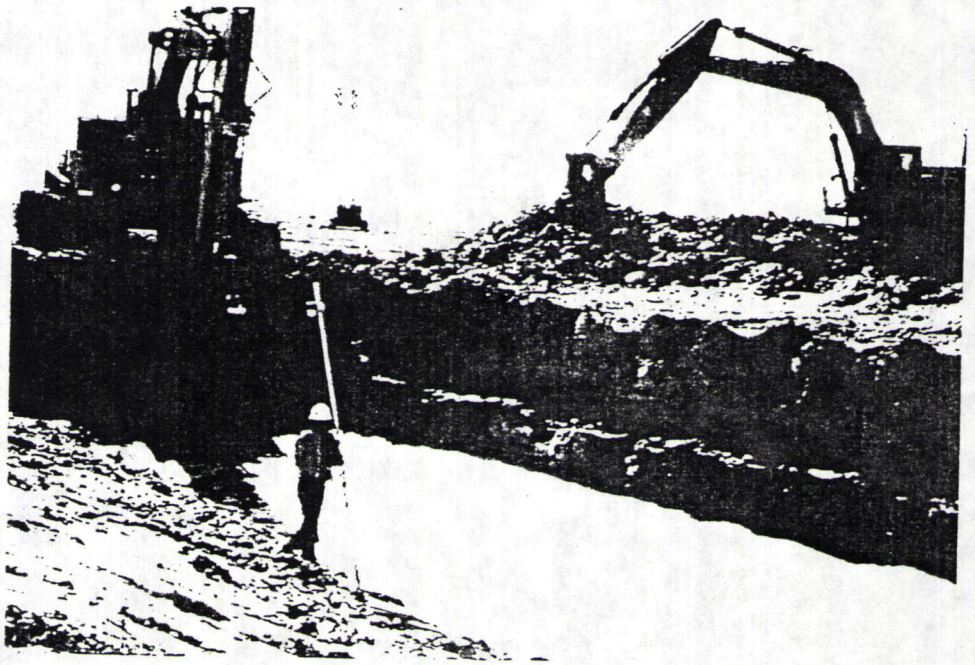
P-1 inlet canal service access bridge.



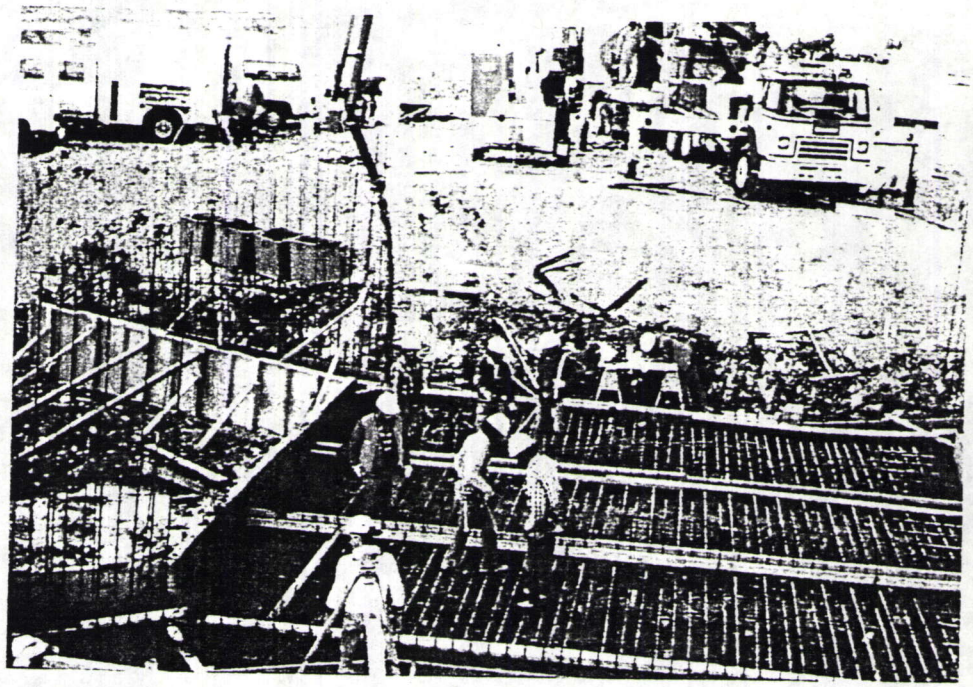
Checking final grade on flooded section of P-1 inlet canal.



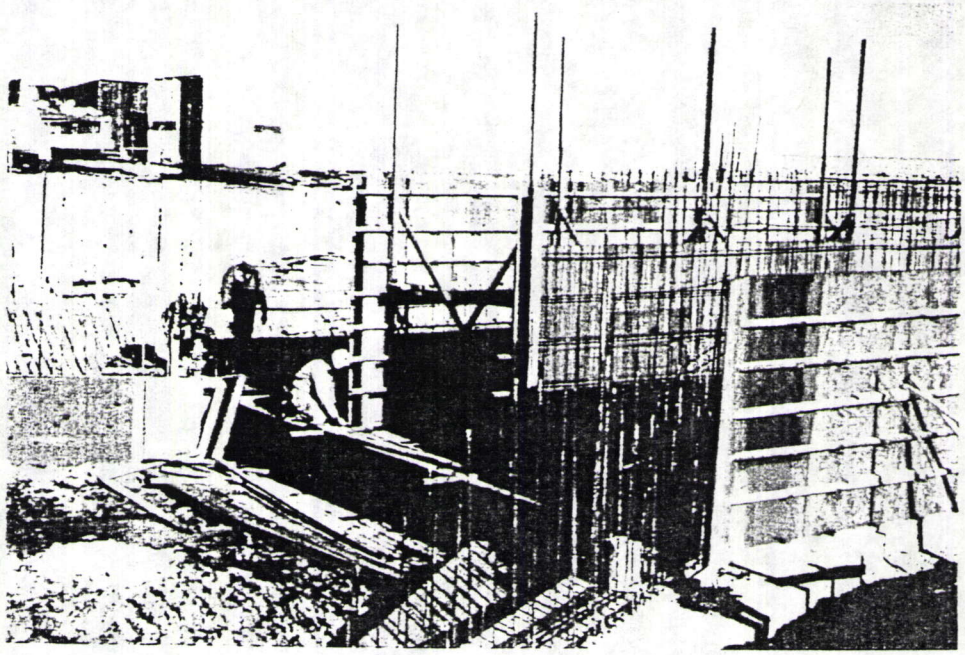
P-1 inlet canal half width excavation. Material required double handling to move to final location.



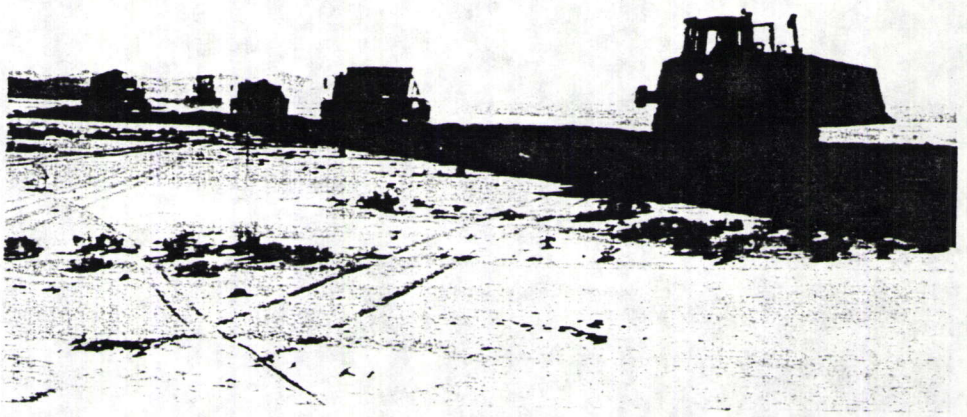
P-1 inlet canal half width excavation.



Footing construction for P-1 pumpstation outlet structure.

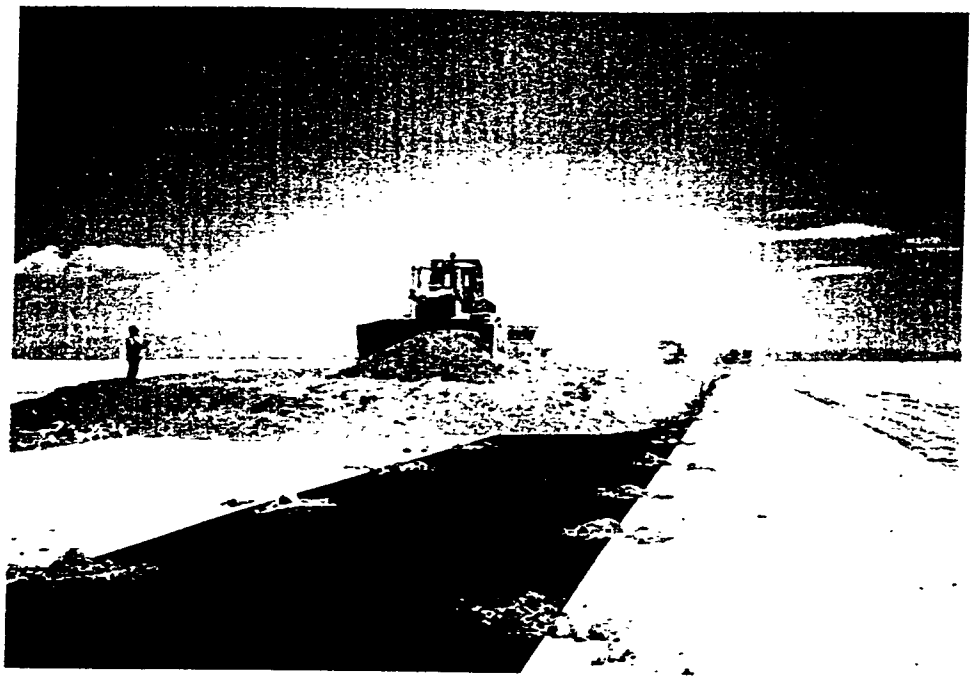


Wall construction for P-1 pumpstation outlet structure.



Haul units turning trucks around at turn outs then backing to leading edge of fill on first lift.

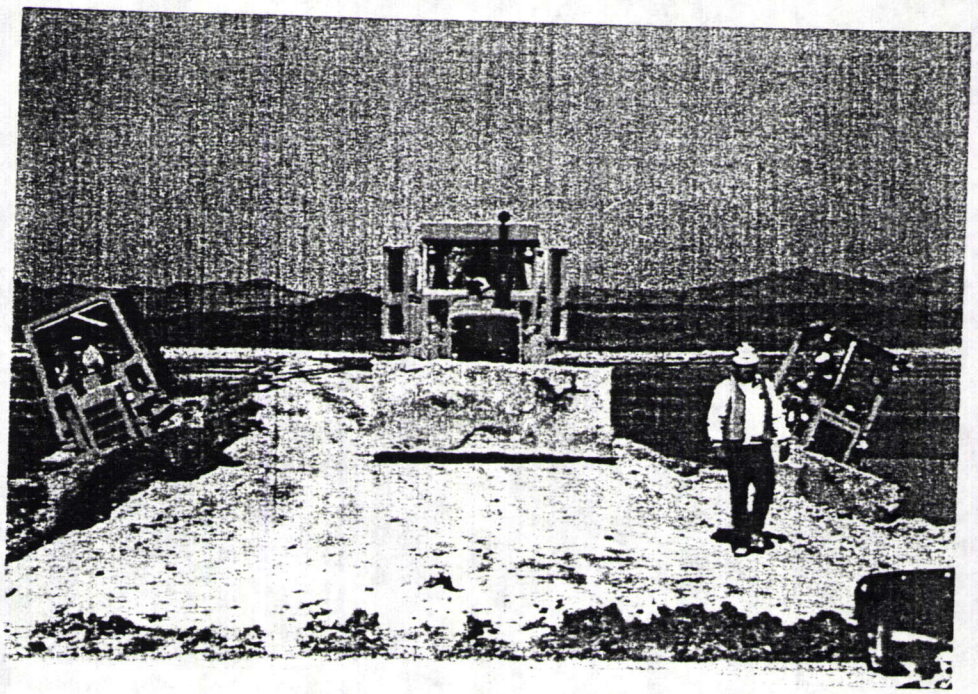
Trucks dumping and dozer advancing loading edge of fill on first lift.



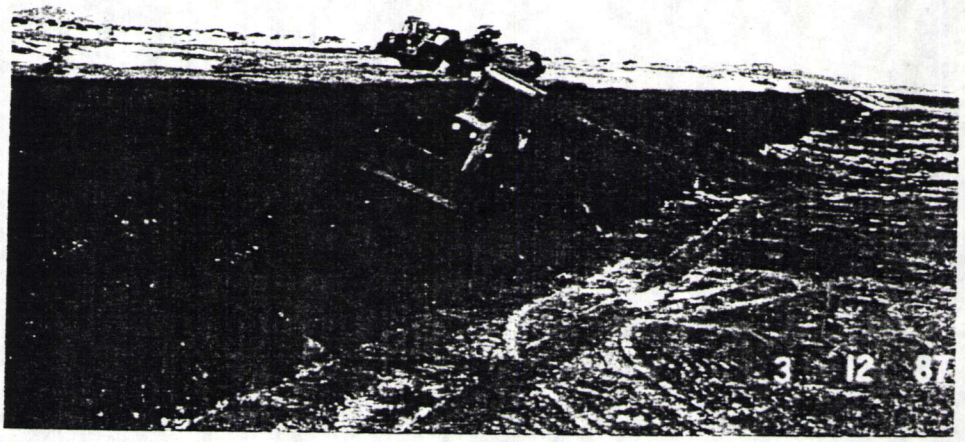
Advancing fill over filter fabric for return load.

Trucks hauling on dike and return road.

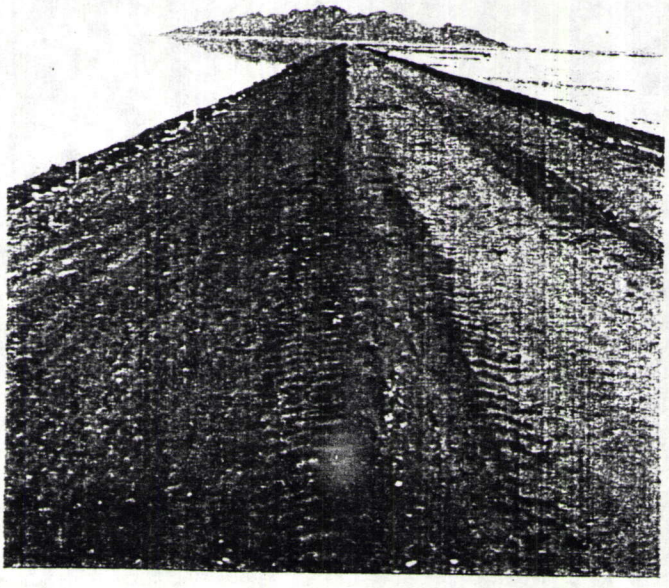
Slope finishing with blade tied off to 623 paddlewheel.



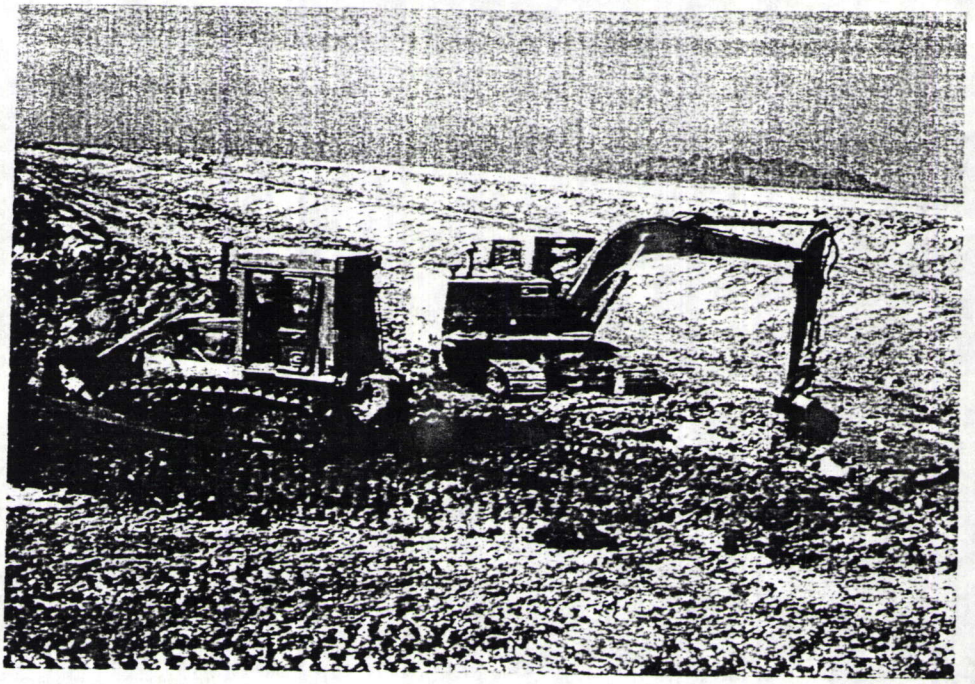
Finishing Pond 7 dikes with D3 and D4 dozers tied off to D6.



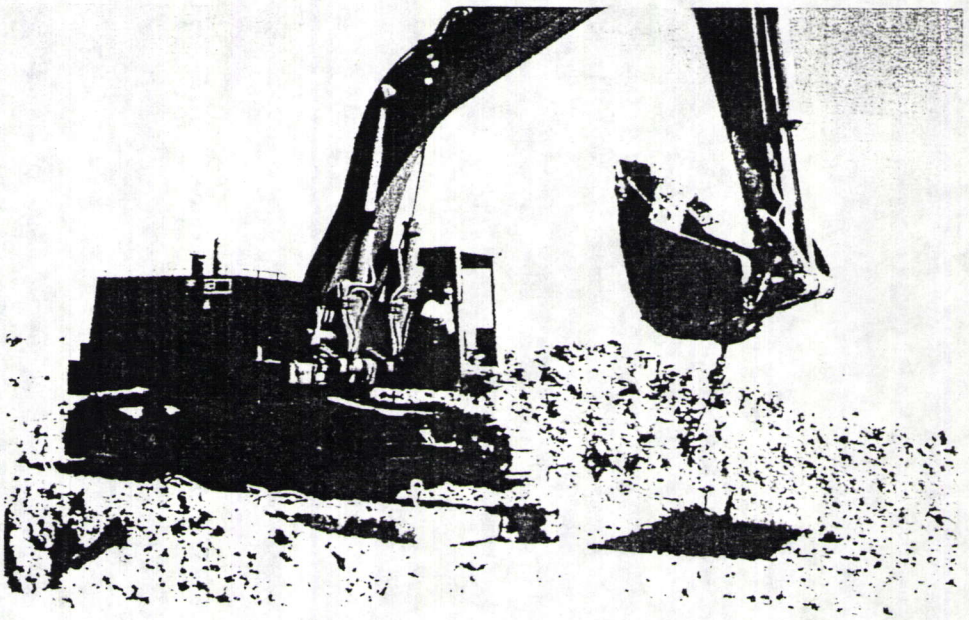
Dozer finishing 250 million gallon reservoir dikes.



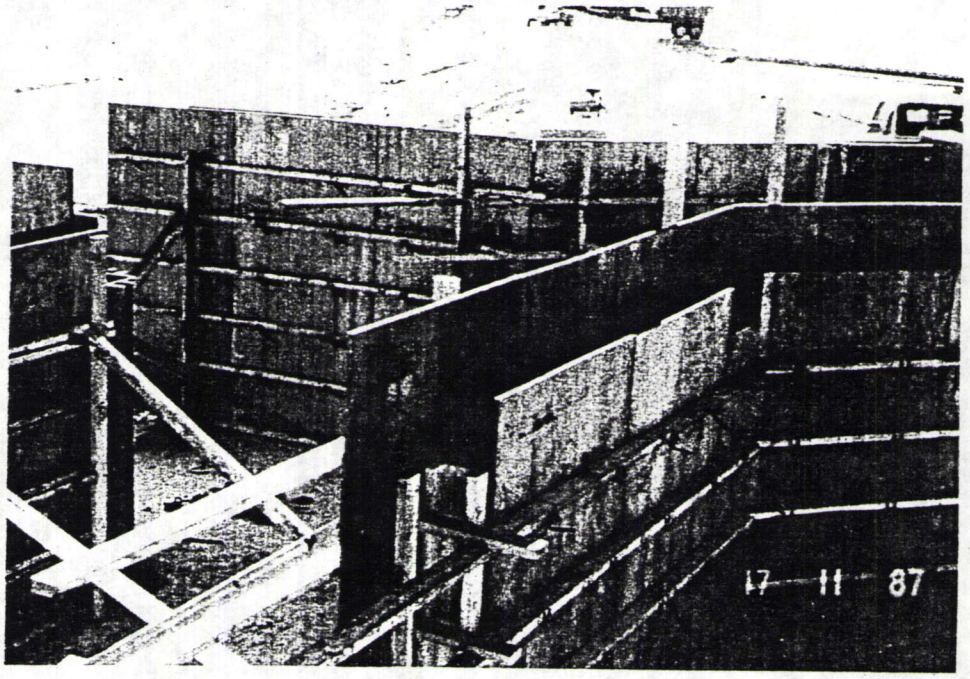
Finished and sold dike section.



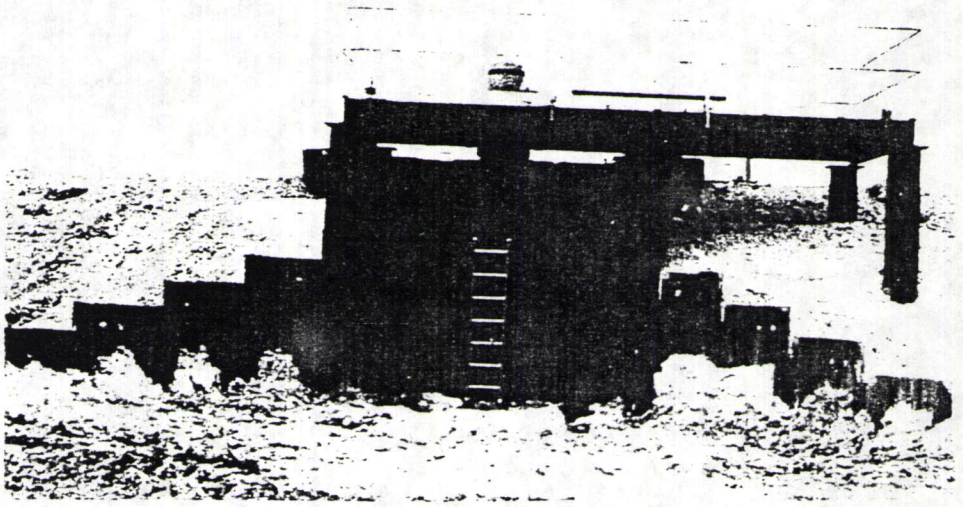
245 hoe excavation, with L.G.P. D6 dozer rehandle, on P-1 inlet canal.



245 hoe shuffling mats. The hoe was required to work off of mats for all inlet canal excavations.



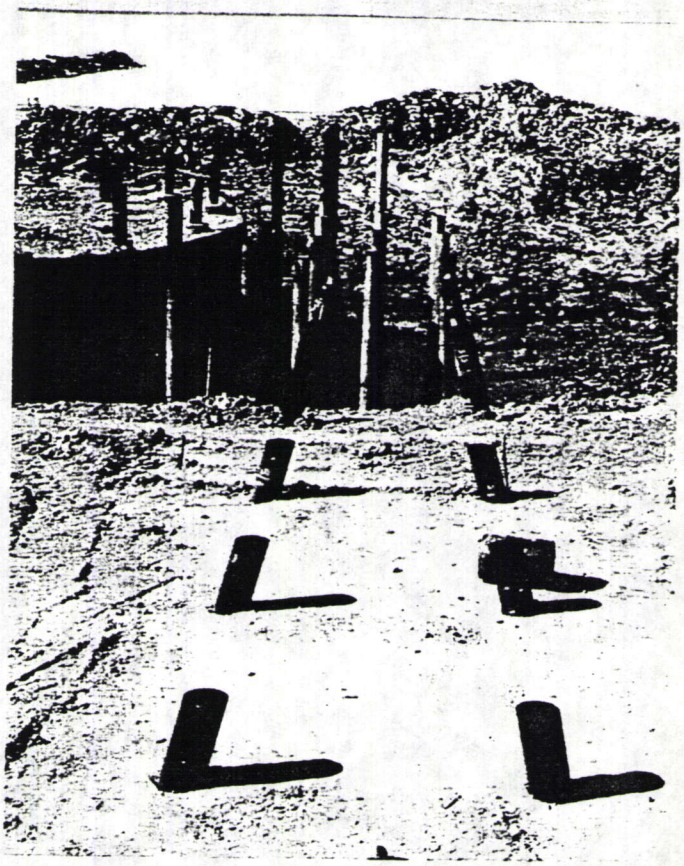
Wall construction for P-1 pumpstation outlet structure.



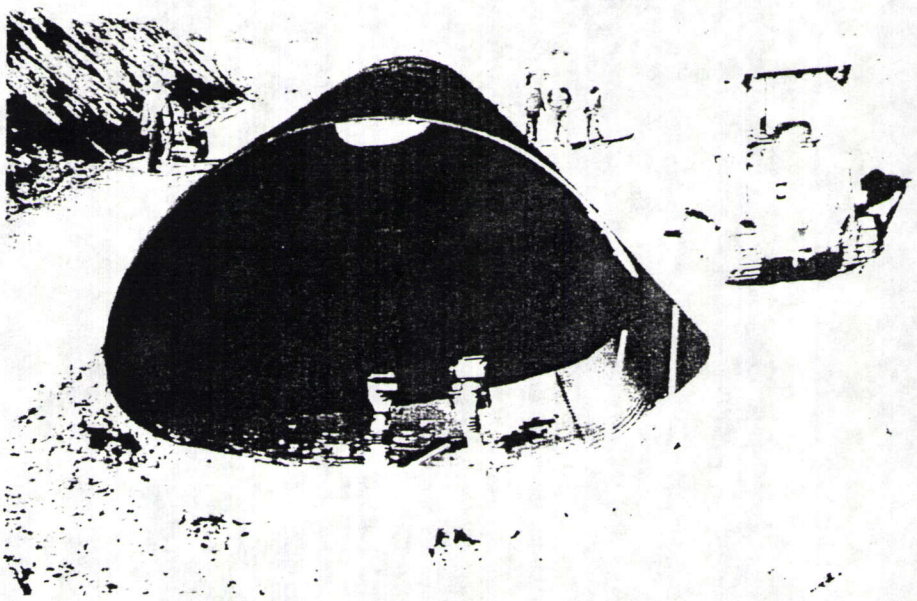
Completed P-4 pumpstation.

P-1 pumpstation outlet structure rip rap.

Pond 7 area flow control gates.



Sheet and pipe pile installation for P-1 pumpstation and flume.



Corrugated metal arch pipe installation.

Weighted Averages for Push Distance Determination

Push Area	Length	yds	Push Dist	yds	Dist * Yds
102	528	1995	45	1995	89760
73	1056	2855	45	2855	128480
476	5000	88148	128.5	88148	11327037
265	6400	62815	103	62815	6469926
222	21000	172667	85	172667	14676667
240	38500	342222	201	342222	68786667
218	2500	20185	171	20185	3451667
327	13300	161078	122	161078	19651489
189	8300	58100	150	58100	8715000
220	4900	39926	147	39926	5869111
929	7500	258056	466	258056	120253889
348	11500	148222	230	148222	34091111
175	7500	48611	138	48611	6708333
73	4000	10815	167	10815	1806074
333	1300	16033	140	16033	2244667
		1431728	2338	1431728	304269877
Wt Avg.		212.519397183			

APPENDIX 19

(Utah State Department of Highways and Bureau of Public Roads)

SALT FLAT INVESTIGATIONS

Progress Report

Parts VI - XIII

In Cooperation with
Utah State Department of Highways
and Bureau of Public Roads

Engineering Experiment Station
College of Engineering

Utah State University
Logan, Utah

January 1962

1. The car's weight is supported only instantaneously and does not allow sufficient time for the salt to deform by creep nor for the confined soil to consolidate.

2. The tire load causes a three-dimensional rather than a two-dimensional stress pattern and additional support of the tire is developed by the salt to the front and the rear as well as to the sides of the tire. This is not true of the two-dimensional highway stress pattern.

3. It must be recognized that a car is very small in comparison with the road bed, and the loads which might be distributed through the blocks of salt provide a major assist in transferring tire loads to the soil. On the other hand, the blocks of salt are so small in comparison with the size of the roadbed that they may be thought of more in terms of bricks floating in a matrix of mud.

4. Actually the soil beneath the salt has a higher bearing capacity than anticipated. Unconfined compression tests indicate that the bearing capacity of the clay is greater than 10 psi. (Refer to Part VI.) Certainly a strength of 10 psi is adequate to support a highway weighing about 700 pounds per square foot, or about 5 psi. Some unconfined compression tests show bearing capacities less than 10 psi; but in every case the material is not clay, but silt or sand. Loose silt or sand in a saturated state can become quick (liquified) if load is applied instantaneously, but the construction of a highway is not an instantaneous process, and the silt and sand layers will have time to consolidate, and if confined, will certainly carry the load.

Conclusions

1. The salt crust cannot be depended upon to contribute flexural support for the proposed interstate highway. It can serve no better purpose than fill material and a possible temporary means of distributing loads of equipment and highway fill until consolidation of the soil can be accomplished.

2. If the salt must be used as fill, then it is desirable that it be sealed against groundwater flow. A serious limitation of salt is its instability in the presence of groundwater flow and its tendency to dissolve and re-crystalize thus relieving stresses and reducing the load-carrying capacity. It may be advisable to place a short section of fill on the salt after preliminary soil tests are made. By observing it for a year, the amount of dissolution and recrystalization of the salt may be noted. However, the Western Pacific Railway line has been placed on fill directly on the salt crust. The railroad company's experience and tests on this fill may reveal the necessary information.

APPENDIX 20

(Utah Division of Oil Gas and Mining Reclamation Costs)

RECLAMATION COST BASIS — last revision 16-Jan-2001

RIPPING D7R

Parameters Used in Calculations for File No.

DETAILS/ASSUMPTIONS

-CAT D7R dozer, 230 hp, semi-U blade, multishank ripper, fixed parallelogram (3 tips)
-shank gauge 6' 6" (tip to tip), pocket spacing 3' 3" (between shanks)
-ASSUME width between passes ~2' 6"=> overall pass width =9.0'
-ASSUME ripping to 12" depth MINIMUM; 1 MPH=88 FPM or 1.5 ft per second
-ASSUME: mtl with seismic velocity of 6,000 fps => ripping at 0.25 MPH
-one acre = 43,560 SF; use ~400' x 110'block
-ASSUME every 400' requires 0.30 min to raise, pivot, turn & lower
-ASSUME work efficiency of 50 minutes/hour => 83%

D7R	DIST	SPEED	ADD	MIN/PASS
Time/Pass =(dist/speed)+add on	400.00	1.00	0.30	4.85
NOTE: SPEED IN MPH		TIME		PASS/HR
#Pass/Hour = time/(MIN/PASS)		50.00		10.32
		FT/PASS		SF/PASS
Sq-ft Ripped/Pass =(length/pass)*(FT/PASS)		9.00		3600.00
				ACRE/PASS
Acre Ripped/Pass = (SF/PASS)/(SF/acre)		CY/Pass		0.08
		133		ACRE/HR
Acre Ripped/Hr =(ACRE/PASS)*(PASS/HR)		CY/HR		0.85
		1,376		HRS/ACRE
Hrs to Rip one acre = 1 /(ACRE/HR)				1.17
		6.8	ACRE/8HR-DAY	

FROM RENTAL RATE BLUE BOOK 3Q/00	EQUIP	OPER	
Hourly Cost, D7R,EROPS,semi-U blade, (pg 9-41)	115.00	30.30	
Multi-shank rippers, 3 parallelogram, 230 hp(pg 9-47)	15.00	2.80	
Sub-totals	130.00	33.10	
Mult by regional factor (page 9-vii)	0.87	1.00	
Sub-totals	112.45	33.10	
Sub-total Equipment & Operating Cost			145.55 ($/HR)
FROM MEANS HEAVY CONSTRUCTION COST DATA 2000			
Crew B-10B, 1-Equip Operator (med), hourly cost			40.87 ($/HR)
TOTAL COST PER HOUR			**186.42 ($/HR)**
COST PER CUBIC YARD	$/CY	0.14	
TOTAL RIPPING COST PER ACRE(rounded)			**$219 ($/ACRE)**
current speed used =	1.00 mph		
RIPPING D7R 230hp			

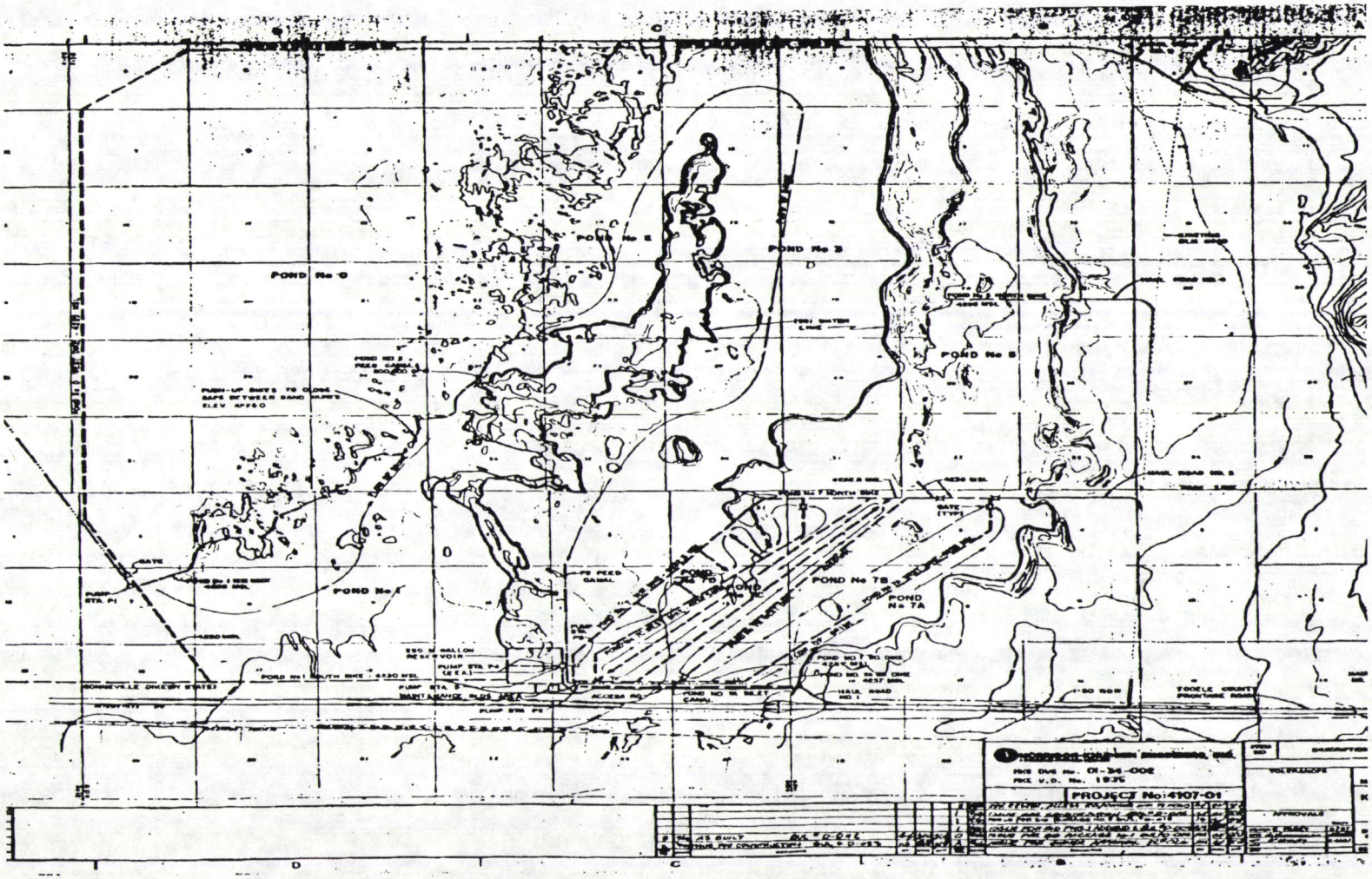
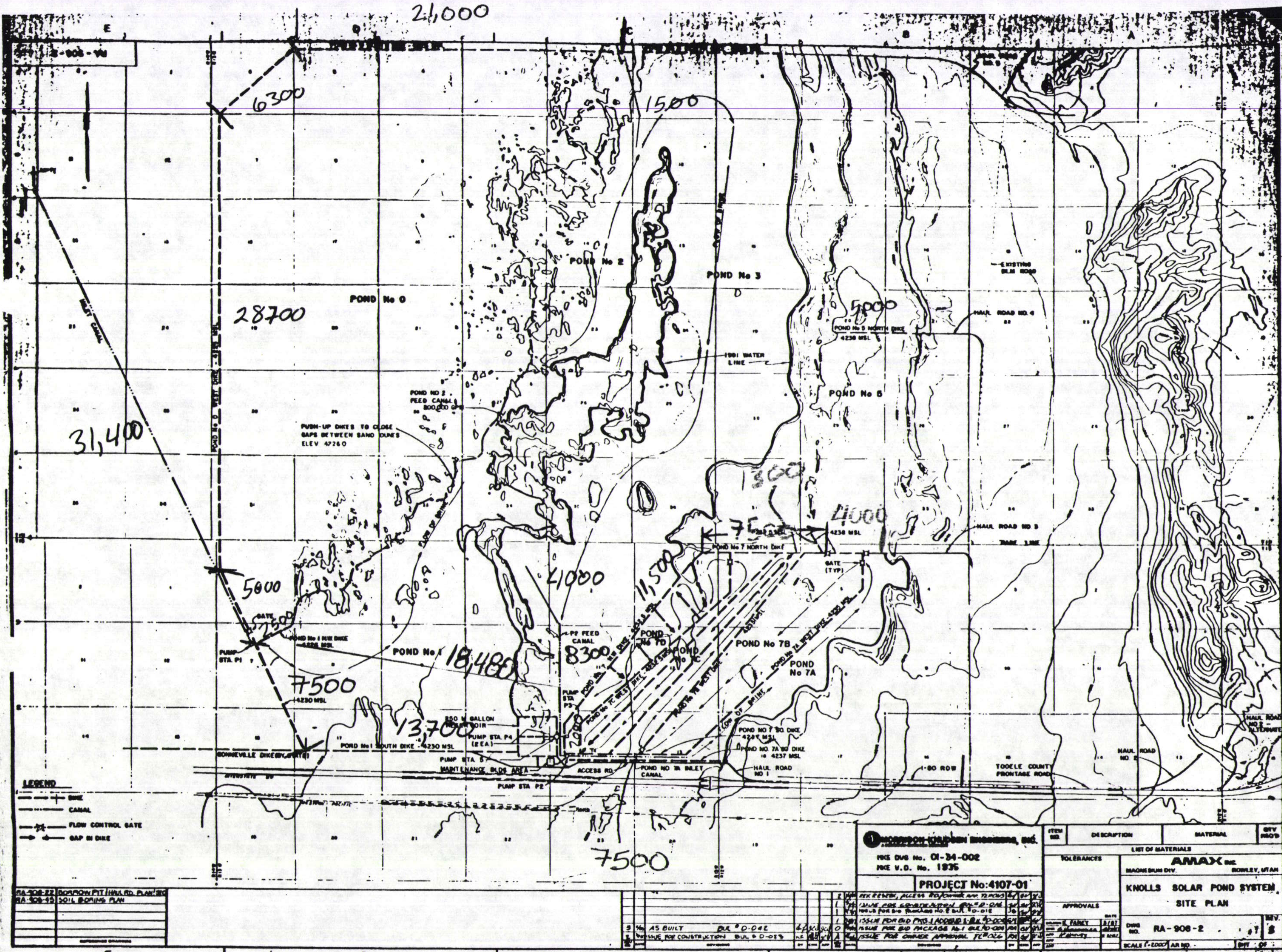


Figure 1



21,000
6300
1500
28700
31,400
5000
7500
18,480
8300
13,700
11,500
4000
1300
POND No 0
POND No 2
POND No 3
POND No 5
POND No 7B
POND No 7A
POND No 1
PUSH-UP DIKES TO CLOSE GAPS BETWEEN SAND DUNES ELEV 4226.0
POND No 2 FEED CANAL 800,000 GPM
1981 WATER LINE
POND No 5 NORTH DIKE 4238 MSL
POND No 7 NORTH DIKE
GATE (TYP)
P2 FEED CANAL
PUMP STA P1
PUMP STA P4
PUMP STA P2
MAINTENANCE BLDG AREA
ACCESS RD.
POND No 1 SOUTH DIKE - 4230 MSL
BONNEVILLE DIKE
POND NO 7A INLET CANAL
HAUL ROAD NO 1
HAUL ROAD NO 2
HAUL ROAD NO 3
HAUL ROAD NO 4
EXISTING BLM ROAD
I-80 ROW
TOOELE COUNTY FRONTAGE ROAD
LEGEND
DIKE
CANAL
FLOW CONTROL GATE
GAP IN DIKE
RA-908-22 BORROW PIT HAUL RD. PLAN
RA-908-12 SOIL BORING PLAN
MORRISON-KNUDSEN ENGINEERS, INC.
MKE DWG No. 01-34-002
MKE V.O. No. 1935
PROJECT No: 4107-01
AS BUILT
ISSUE FOR CONSTRUCTION
LIST OF MATERIALS
DESCRIPTION
MATERIAL
TOLERANCES
APPROVALS
AMAX Inc.
MAGNESIUM DIV.
ROWLEY, UTAH
KNOLLS SOLAR POND SYSTEM
SITE PLAN
RA-908-2

Independent Statistics Consultant.

Very good experiences with Utah DOGM and Federal OSM.

Skillful in statistics but still good at maintaining reality and actual, in-the-field application.

John W. Kern
Spectrum Consulting Services
415 NW Robert
Pullman, WA 99163

(509) 339-2489

johnk1@gte.net

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Pane Describe Compare Relate Special View Window Help

StatAdvisor

Welcome to the StatAdvisor. The StatAdvisor is designed to assist in interpreting the results of statistical procedures. It will explain the results of statistical tests, warn you about any critical assumptions which may be violated by your data, and suggest other procedures which might be applied.

You can access this window at any time by pressing the StatAdvisor button on the main toolbar. You can also have StatAdvisor output added automatically to the bottom of all text panes by checking StatAdvisor under View on the main menu.

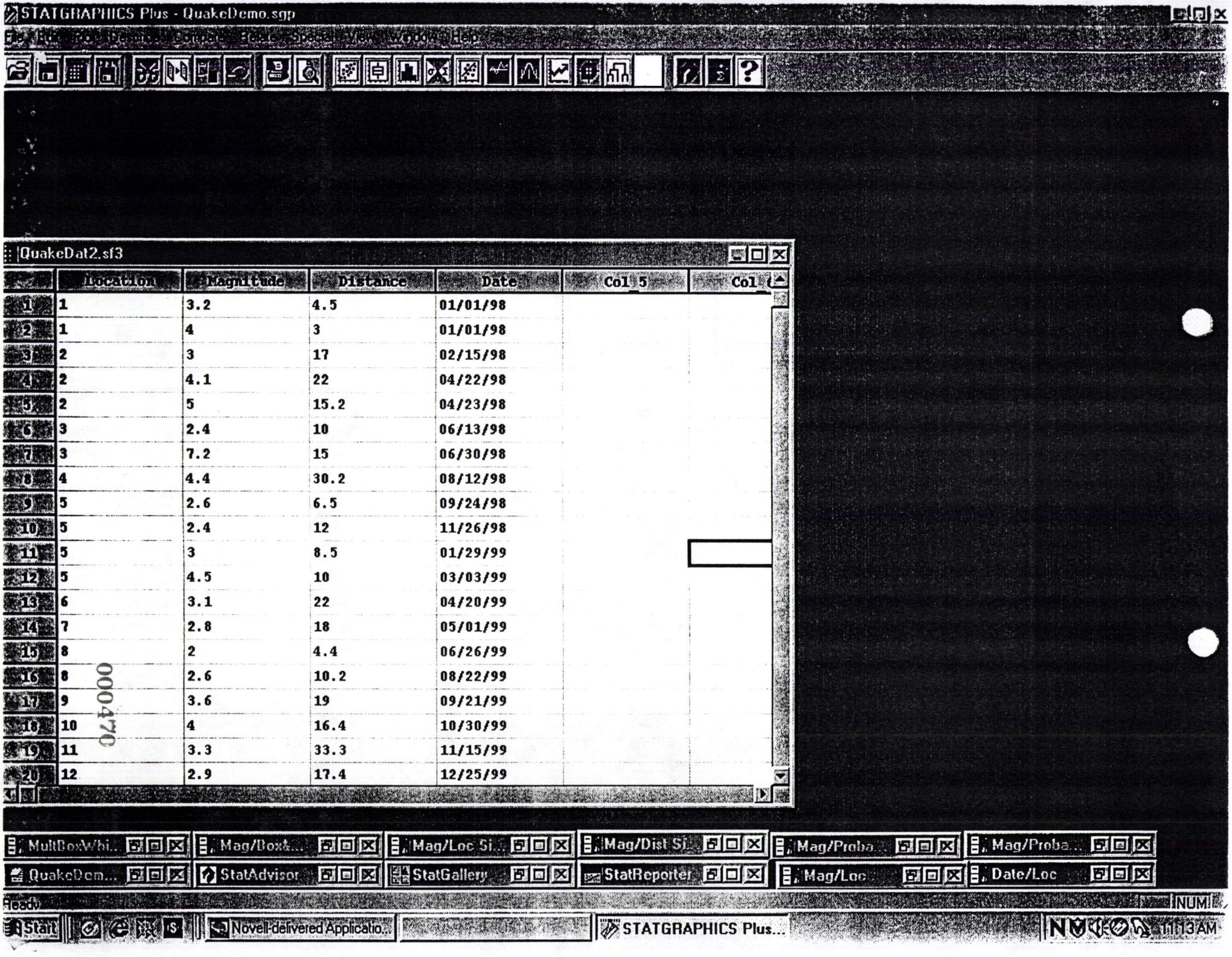
000469

10	4	16.4	10/30/99
11	3.3	33.3	11/15/99
12	2.9	17.4	12/25/99

QuakeDem... StatGallery StatReporter Date/Loc Mag/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 10:20 AM


STATGRAPHICS Plus - QuakeDemo.sgp
File Edit Pane Data Compute Plot Special Tools Window Help
QuakeDat2.sf3
Location
Magnitude
Distance
Date
Col_5
Col_6
1 1 3.2 4.5 01/01/98
2 1 4 3 01/01/98
3 2 3 17 02/15/98
4 2 4.1 22 04/22/98
5 2 5 15.2 04/23/98
6 3 2.4 10 06/13/98
7 3 7.2 15 06/30/98
8 4 4.4 30.2 08/12/98
9 5 2.6 6.5 09/24/98
10 5 2.4 12 11/26/98
11 5 3 8.5 01/29/99
12 5 4.5 10 03/03/99
13 6 3.1 22 04/20/99
14 7 2.8 18 05/01/99
15 8 2 4.4 06/26/99
16 8 2.6 10.2 08/22/99
17 9 3.6 19 09/21/99
18 10 4 16.4 10/30/99
19 11 3.3 33.3 11/15/99
20 12 2.9 17.4 12/25/99
000470
MultBoxWhi...
Mag/Box...
Mag/Loc Si...
Mag/Dist Si...
Mag/Proba...
Mag/Proba...
QuakeDem...
StatAdvisor
StatGallery
StatReporter
Mag/Loc
Date/Loc
Ready
NUM
Start
Novell-delivered Applicatio...
STATGRAPHICS Plus...
11:13 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Edit2 Describe Compare Relate Special View Window Help

Mag/Loc

Lbl: Row:

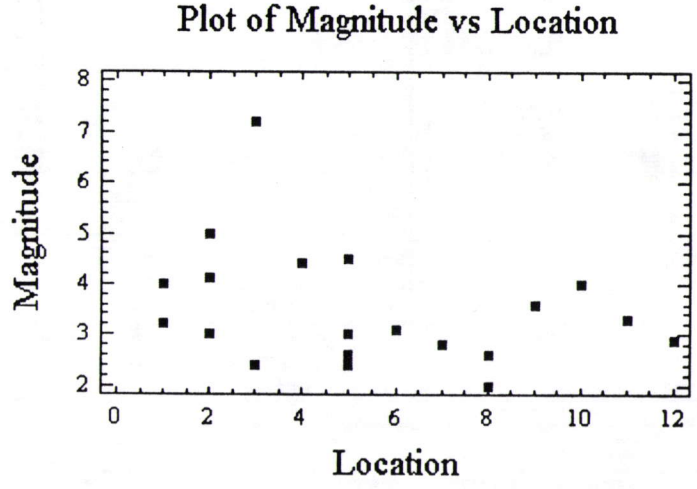
Analysis Summary

X variable: Location
Y variable: Magnitude

20 values

The StatAdvisor

This procedure creates a scatterplot of Magnitude versus Location. To fit a curve to this data, select Relate - Simple Regression from the main menu.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000471

MultBox Whi... Mag/Box... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:13 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Pane Describe Compare Relate Special View Window Help

Date/Loc

Lbl: Row:

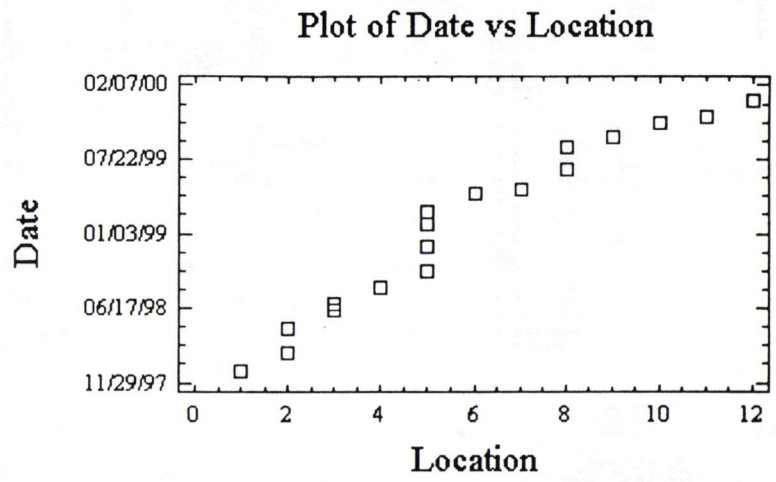
Analysis Summary

X variable: Location
Y variable: Date

20 values

The StatAdvisor

This procedure creates a scatterplot of Date versus Location. To fit a curve to this data, select Relate - Simple Regression from the main menu.



9	5	2.6	6.5	09/24/98
10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000472

MultBoxWhi... Mag/Box... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:14AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

MultBoxWhisk

Lbl: Row:

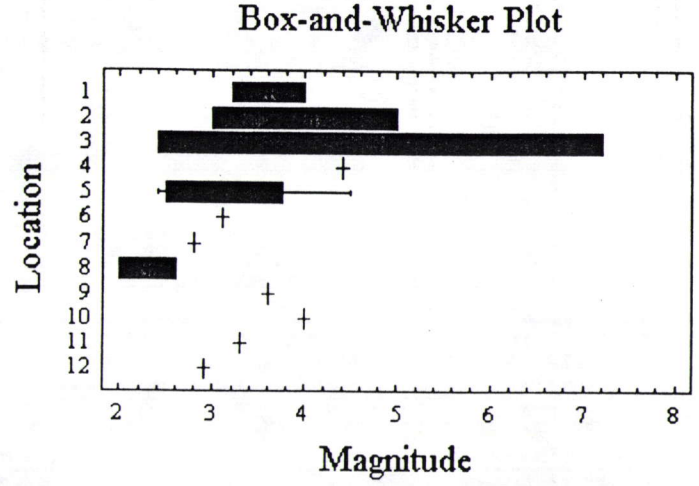
Analysis Summary

Dependent variable: Magnitude
Factor: Location

Number of observations: 20
Number of levels: 12

The StatAdvisor

This procedure constructs box-and-whisker plots to compare the 12 samples of Magnitude. For a detailed statistical analysis of this data, select Compare - Analysis of Variance - One-Way ANOVA from the main menu.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000473

Mag/Box&... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:14 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Box&Whisk

Lbl: Row:

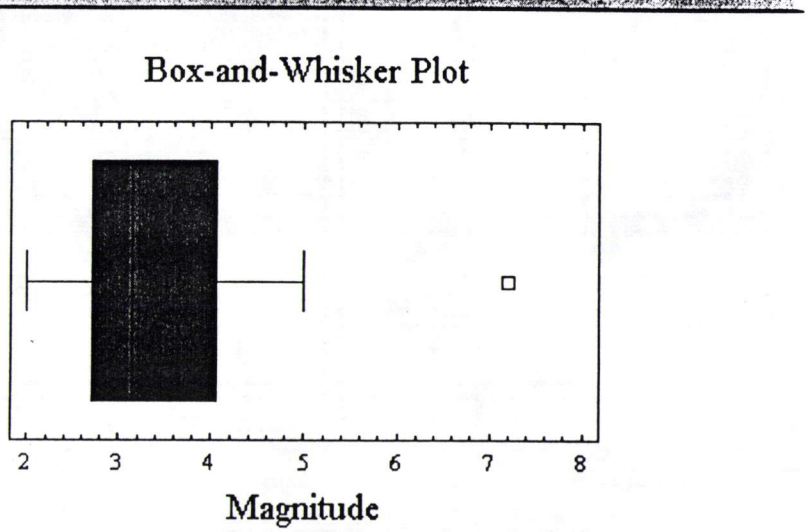
Analysis Summary

Data variable: Magnitude

20 values ranging from 2.0 to 7.2

The StatAdvisor

This procedure displays a box-and-whisker plot of a single column of data. You can create many other graphs and statistics for the data by selecting Describe - Numeric Data - One-Variable Analysis from the main menu.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

00474

MultBoxWhi... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:14 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Loc Simple Regression

Lbl: Row:

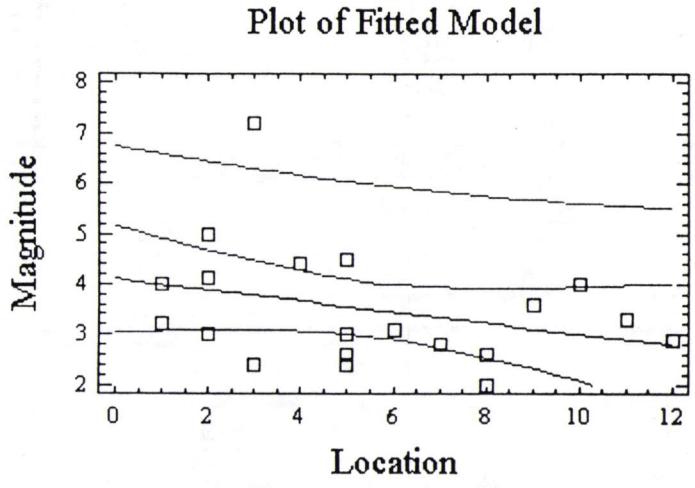
Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Magnitude
Independent variable: Location

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	4.09991	0.502762	8.15477	0.0000
Slope	-0.109157	0.0791481	-1.37915	0.1847

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

00475

MultBoxWhi... Mag/Box... Mag/Dist St... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:15 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Dist Simple Regression

Ldt: Row:

Regression Analysis - Linear model: Y = a + b*X

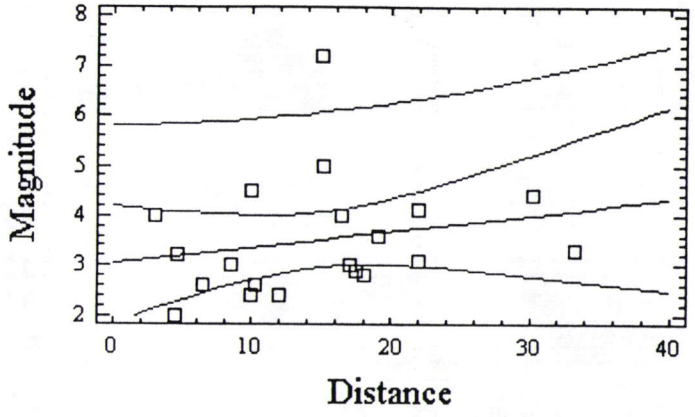
Dependent variable: Magnitude
Independent variable: Distance

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	3.03386	0.55798	5.43723	0.0000
Slope	0.0319848	0.0333402	0.959345	0.3501

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio

Plot of Fitted Model



9	5	2.6	6.5	09/24/98
10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000476

MultBoxWhi... Mag/Box... Mag/Loc Sl... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Start Novell-delivered Applicatio... STATGRAPHICS Plus... NUM 11:15 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Probability Plots

Lbl: Row:

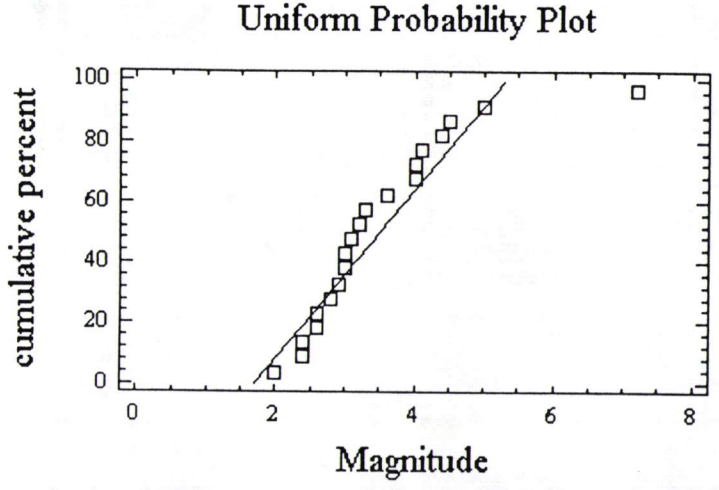
Probability Plots

Data variable: Magnitude

Number of observations: 20
Number of values below minimum: 0
Number of values above maximum: 0

The StatAdvisor

This procedure creates seven different types of probability plots to help you determine whether Magnitude comes from a particular type of distribution. After examining these plots, you may fit a distribution to the data by selecting the Distribution Fitting procedure.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000477

MultBoxWhi... Mag/Box&... Mag/Loc Si... Mag/Dist Si... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:15 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Describe Compare Relate Special View Window Help

Mag/Probability Plot

Lbl: Row:

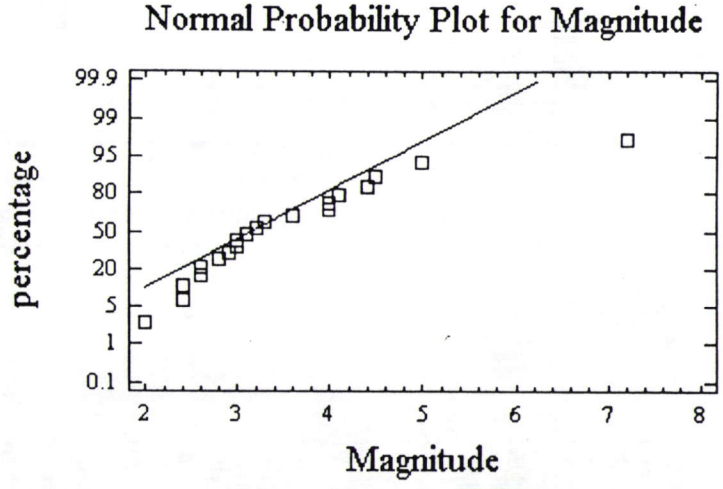
Analysis Summary

Data variable: Magnitude

20 values ranging from 2.0 to 7.2

The StatAdvisor

This procedure displays a normal probability plot of a single column of data. You can create many other graphs and statistics for the data by selecting Describe - Numeric Data - One-Variable Analysis from the main menu.



14	7	2.8	18	05/01/99	
15	8	2	4.4	06/26/99	
16	8	2.6	10.2	08/22/99	
17	9	3.6	19	09/21/99	
18	10	4	16.4	10/30/99	
19	11	3.3	33.3	11/15/99	
20	12	2.9	17.4	12/25/99	

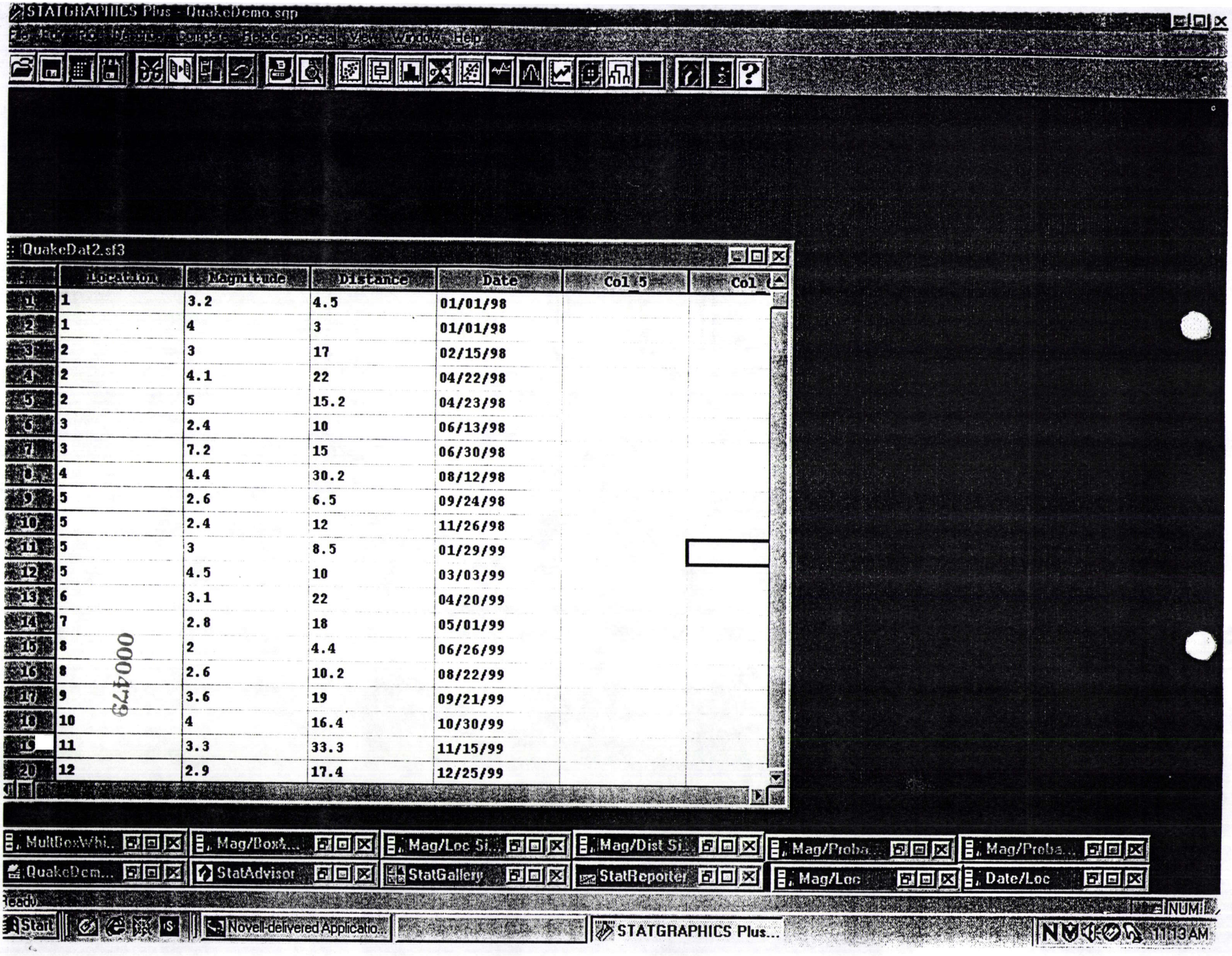
000478

MultBoxWhi... Mag/Box$... Mag/Loc Si... Mag/Dist Si... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:15 AM


STATGRAPHICS Plus - QuakeDemo.sgp
File Edit Pro Describe Compare Relate Special View Window Help
QuakeDat2.sf3
Location
Magnitude
Distance
Date
Col 5
Col
1 1 3.2 4.5 01/01/98
2 1 4 3 01/01/98
3 2 3 17 02/15/98
4 2 4.1 22 04/22/98
5 2 5 15.2 04/23/98
6 3 2.4 10 06/13/98
7 3 7.2 15 06/30/98
8 4 4.4 30.2 08/12/98
9 5 2.6 6.5 09/24/98
10 5 2.4 12 11/26/98
11 5 3 8.5 01/29/99
12 5 4.5 10 03/03/99
13 6 3.1 22 04/20/99
14 7 2.8 18 05/01/99
15 8 2 4.4 06/26/99
16 8 2.6 10.2 08/22/99
17 9 3.6 19 09/21/99
18 10 4 16.4 10/30/99
19 11 3.3 33.3 11/15/99
20 12 2.9 17.4 12/25/99
000479
MultBoxWhi...
Mag/Box...
Mag/Loc Si...
Mag/Dist Si...
Mag/Proba...
Mag/Proba...
QuakeDem...
StatAdvisor
StatGallery
StatReporter
Mag/Loc
Date/Loc
Ready
NUM
Start
Novell-delivered Applicatio...
STATGRAPHICS Plus...
11:13 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Loc

Lbl: Row:

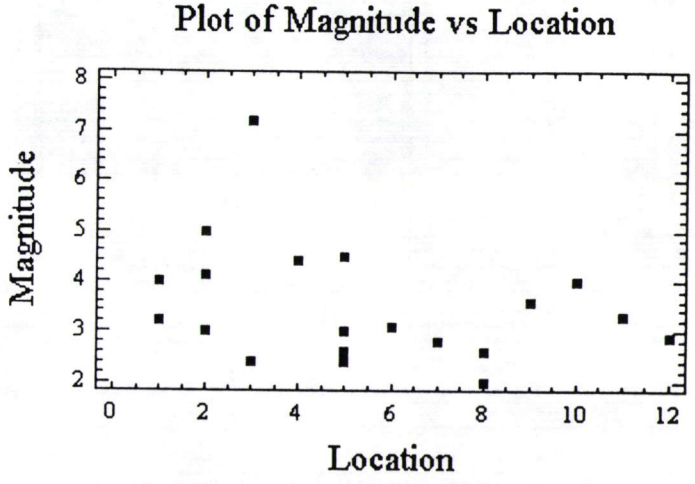
Analysis Summary

X variable: Location
Y variable: Magnitude

20 values

The StatAdvisor

This procedure creates a scatterplot of Magnitude versus Location. To fit a curve to this data, select Relate - Simple Regression from the main menu.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000480

MultBoxWhi... Mag/Box&... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:13 AM

STATGRAPHICS Plus - QuakeDemo.sgp

Date/Loc

Lbl: Row:

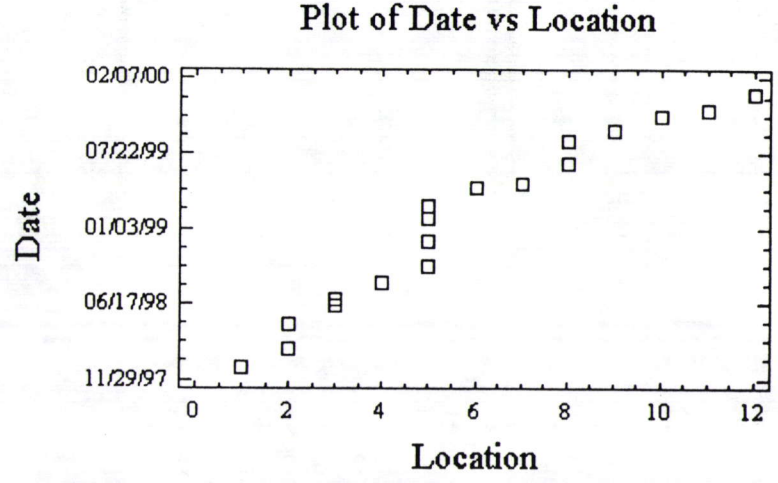
Analysis Summary

X variable: Location
Y variable: Date

20 values

The StatAdvisor

This procedure creates a scatterplot of Date versus Location. To fit a curve to this data, select Relate - Simple Regression from the main menu.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000481

MultBoxWhi... Mag/Box&... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...
QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc

Start Novell-delivered Applicatio... STATGRAPHICS Plus... NUM 11:14 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Tables Data Tools Compare Relate Special View Window Help

MultBoxWhisk

Ldt Row

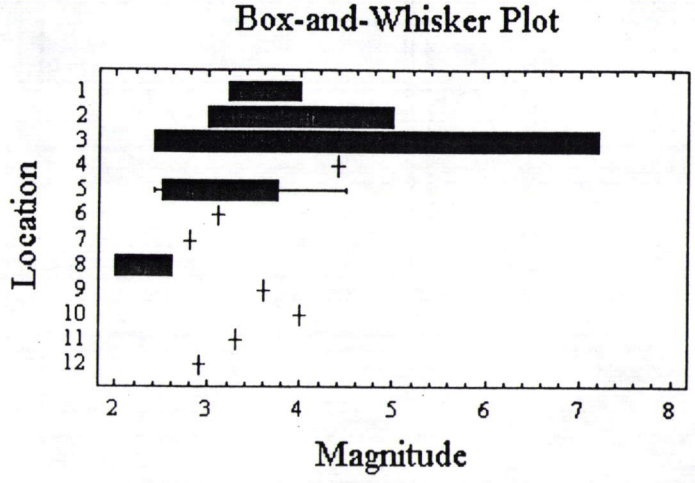
Analysis Summary

Dependent variable: Magnitude
Factor: Location

Number of observations: 20
Number of levels: 12

The StatAdvisor

This procedure constructs box-and-whisker plots to compare the 12 samples of Magnitude. For a detailed statistical analysis of this data, select Compare - Analysis of Variance - One-Way ANOVA from the main menu.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000482

Mag/Box... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:14 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Box&Whisk

Ldt Row

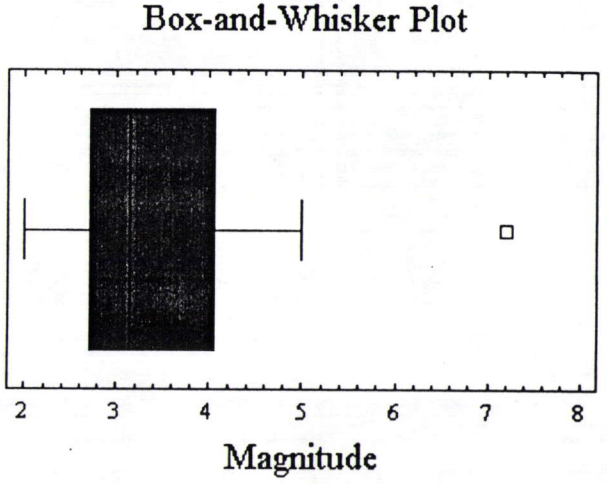
Analysis Summary

Data variable: Magnitude

20 values ranging from 2.0 to 7.2

The StatAdvisor

This procedure displays a box-and-whisker plot of a single column of data. You can create many other graphs and statistics for the data by selecting Describe - Numeric Data - One-Variable Analysis from the main menu.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000483

MultBoxWhi... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:14 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Loc Simple Regression

Lbl: Row:

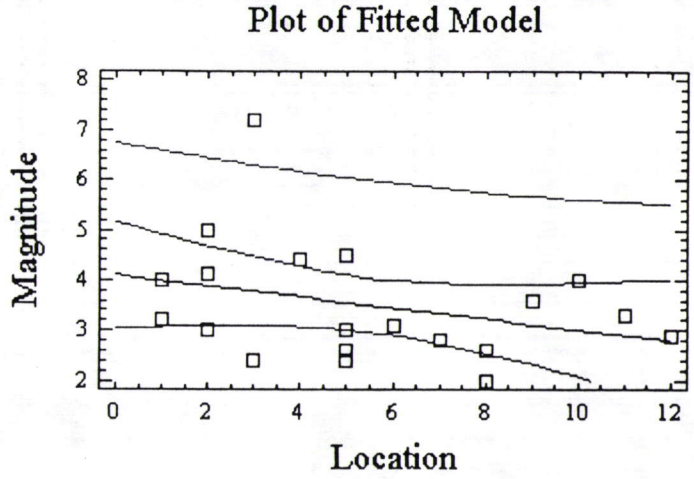
Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Magnitude
Independent variable: Location

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	4.09991	0.502762	8.15477	0.0000
Slope	-0.109157	0.0791481	-1.37915	0.1847

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000484

MultBoxWhi... Mag/Boxt... Mag/Dist Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:15AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Dist Simple Regression

Lbl: Row:

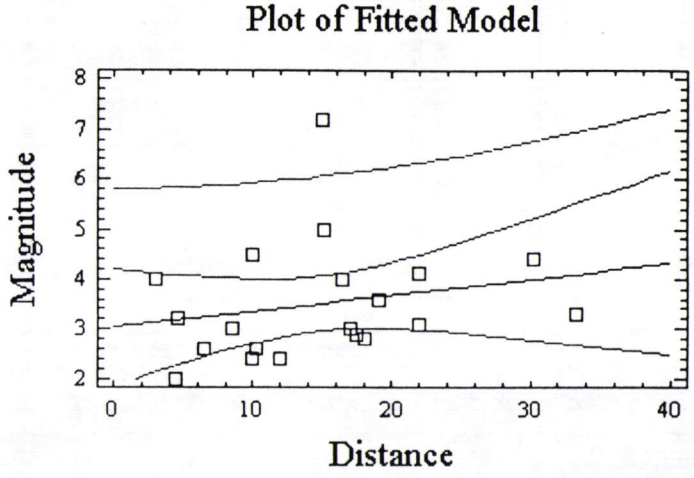
Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Magnitude
Independent variable: Distance

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	3.03386	0.55798	5.43723	0.0000
Slope	0.0319848	0.0333402	0.959345	0.3501

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio



9	5	2.6	6.3	09/24/98
10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000485

MultBoxWhi... Mag/Box&... Mag/Loc Si... Mag/Proba... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:15 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Probability Plots

Lbl: Row:

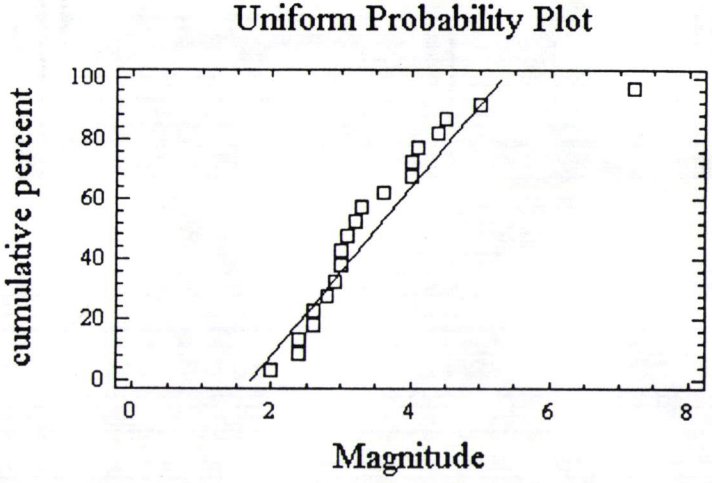
Probability Plots

Data variable: Magnitude

Number of observations: 20
Number of values below minimum: 0
Number of values above maximum: 0

The StatAdvisor

This procedure creates seven different types of probability plots to help you determine whether Magnitude comes from a particular type of distribution. After examining these plots, you may fit a distribution to the data by selecting the Distribution Fitting procedure.



10	5	2.4	12	11/26/98
11	5	3	8.5	01/29/99
12	5	4.5	10	03/03/99
13	6	3.1	22	04/20/99
14	7	2.8	18	05/01/99
15	8	2	4.4	06/26/99
16	8	2.6	10.2	08/22/99
17	9	3.6	19	09/21/99
18	10	4	16.4	10/30/99
19	11	3.3	33.3	11/15/99
20	12	2.9	17.4	12/25/99

000486

MultBoxWhi... Mag/Box... Mag/Loc Si... Mag/Dist Si... Mag/Proba...

QuakeDem... StatAdvisor StatGallery StatReporter Mag/Loc Date/Loc

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:15 AM

STATGRAPHICS Plus - QuakeDemo.sgp

File Edit Plot Describe Compare Relate Special View Window Help

Mag/Probability Plot

Lbl: Row:

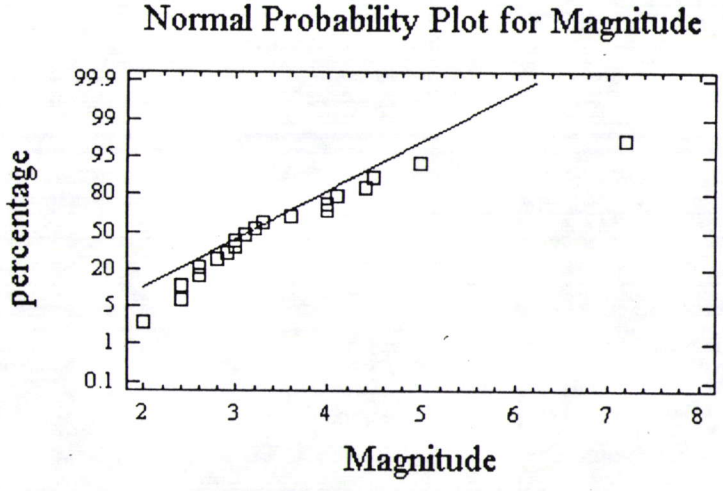
Analysis Summary

Data variable: Magnitude

20 values ranging from 2.0 to 7.2

The StatAdvisor

This procedure displays a normal probability plot of a single column of data. You can create many other graphs and statistics for the data by selecting Describe - Numeric Data - One-Variable Analysis from the main menu.



14	7		2.8	18	05/01/99
15	8		2	4.4	06/26/99
16	8		2.6	10.2	08/22/99
17	9		3.6	19	09/21/99
18	10		4	16.4	10/30/99
19	11		3.3	33.3	11/15/99
20	12		2.9	17.4	12/25/99

000487

MultBoxWhi... Mag/Box&... Mag/Loc Si... Mag/Dist Si... Mag/Proba... Mag/Loc Date/Loc

QuakeDem... StatAdvisor StatGallery StatReporter

Ready NUM

Start Novell-delivered Applicatio... STATGRAPHICS Plus... 11:15 AM